TRACK and STRUCKS

ALL ABOARD FOR CHRISTMAS

THE NATIONAL LOCK WASHER COMPANY, NEWARK 5, N. J., U. S. A.

A COMPLETE LINE OF RAILWAY SPRING WASHERS

REBSGIOW... FIRST in the 7ield!





Also FIRST with a

- Ballast Regulator
- Jack-All (Combination Jack and Tamper)
- Track Broom
- Cribber-Adzer
- Tamper To Tamp Through Switches
- Deadhead Detector



Now ... more than ever ...

Recognize This Symbol of Leadership ...



The Complete Line of Kershaw Track Maintenance Equipment
BALLAST REGULATOR, SCARIFIER and PLOW and ATTACHMENTS SINGLE WHEEL TYPE
KRIBBER MOCAR CRANE CRIBBER-ADZER JACK-ALL TRACK CRANE
TIE BED CLEANER TRACK BROOM TRACK SKELETONIZER and UNDERCUTTER
BALLAST CLEANER and DISTRIBUTOR SPOT TAMPER TWO WHEEL KRIBBER
CHEMICAL SPREADER CAR DEADHEAD DETECTOR RAIL RE-LAYER



HEAT-TREATED TRACKWORK ON THE PENNSYLVANIA — This bolted rail crossing is among many heat-treated track components furnished to the Pennsylvania Railroad by Bethlehem. The PRR also uses heat-treated switch points up to 45 ft in length. Heat-treatment improves the strength of rail steel so that it will stand up better under the impact and wear of ever-increasing train speeds and wheel loads. Battering and wearing of rail-heads is thus reduced; the service life of the rail is extended. Bethlehem heat-treating facilities are unequalled, and are described in detail in Catalog 379, "Bethlehem Heat-Treated Trackwork." You can get a copy through the Bethlehem district office nearest you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

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BETHLEHEM STEEL

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Goes the fast, efficient way of oxygen cutting

Sixty-three years old, and one of the first all steel structures built in the United States, the steam operated swing span, shown at left above, has carried up to 140,000 passengers a day in and out of New York's busy Manhattan Island. After suffering the mechanical ills of old age, this New York Central Railroad bridge was skillfully removed by using LINDE oxygen cutting.

The old bridge had a four track right of way with a girder structure separating tracks 1 and 3 from 2 and 4. After the tracks were taken up, the deck of the bridge was divided by a series of transverse and longitudinal cuts, and removed. Super structure beams were next to be cut off. Finally, the main side girders were cut into portable lengths and lowered away.

Oxygen and acetylene gases were supplied to the cutting torches by centrally located LINDE cylinders manifolded

No matter what your fabricating, repairing, or scrapping needs may be-LINDE can help you do the best job, in the least amount of time. Call your local LINDE representative for detailed information on LINDE's processes-or write for specially prepared literature. Start saving now, do it today.

this familiar symbol . . .

BAILBOAD DEPARTMENT



Supplying to railroads the complete line of

welding and cutting materials and modern

methods furnished for over forty years under

A Division of Union Carbide and Carbon Corporation

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Division of Union Carbide Canada Limited, Toronto

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for ALL-SEASON WEED and BRUSH CONTROL

• Whatever your particular weed, grass or brush control problem — Nalco has the safe, sure answer in this complete selection of proved chemical treatments . . . 10 in all.

Nalco also assures the most economical application possible... with mechanical spreaders and shaker boxes for small and hard-to-reach areas... with various sized drums, and tank carlots for use in modern Nalco Spray Cars.

Right now is the time to start your fullseason weed control program with Nalco Chemicals. Ask for full facts on scheduling and prices.

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SPRAY SERVICES DEPARTMENT

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CHEMICAL

Of

Control

Nolco H-170 Weed

One gail. per 1000

After predominant grasses emerge. Use in combination with Social gas, if, with one goil. H-170 per 1300 sq. ft.

One gailer per 4500 sq. ft, with one goil. H-170 per 1300 sq. ft.

One gailer per 4500 sq. ft.

Inoroughly weith one goil. After predominant grasses emerge. Use fool of gailer sp. ft.

So like bags and 3½ like, shoker boxes.

So like bags and 3½ like, shoker boxes.

So like bags and 3½ like, shoker boxes.

So like and one goil.

After predominant grasses emerge. Use fool of sq. weiter.

So like bags and 3½ like, shoker boxes.

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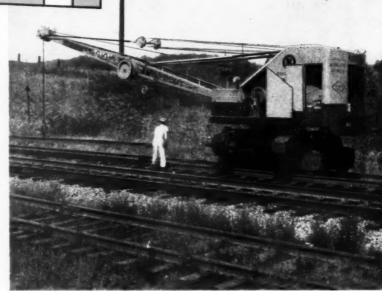
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PRODUCTS . . . Serving the Railroads through Practical Applied Scient



Koehring 205 RailAid powers its own rail car. It travels on-, track from one work section to the next at speeds up to 20 m.p.h. — works on or off-car with all standard excavator or crane attachments. You can send it anywhere along the line or in yards at a moment's notice to do any digging, lifting or material-handling. Does 2 to 3 times the work of ordinary excavators or cranes that have to crawl or be hauled from job to job. Propulsion car has 2-axle drive, with airbrakes on all 4 standard-flange wheels. Torque converter gives smooth control of travel speeds. Car-well accommodates 16, 20 or 24-inch crawlers on the heavy-duty excavator or crane.





In less than 10 minutes, Koehring 205 loads or unloads itself on the ramp equipped propulsion car. Crane or excavator sets the car on or off-track, clears the right-of-way for normal traffic. Work of the 205 and road crew is uninterrupted during the entire shift. This on and off-track flexibility is combined with big work capacity. As a crane, the heavy-duty 205 safely lifts 6.9 tons from the car - 8.9 tons on the ground. It readily converts to clamshell, dragline, pile-driver, 1/2-yard shovel or hoe. This versatile 205 RailAid is widely used by many of the country's leading railroads (names available on request). Better get all the facts on what it can do for you.

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Ditching Rail laying Stockpiling **Piledriving** Wrecking Salvage Grading Clearing slides Widening banks Repairing trestles **Erecting bridges** Setting steel Loading cars Storing parts Handling: timbers, ties, ballast, ash, coal, scrap

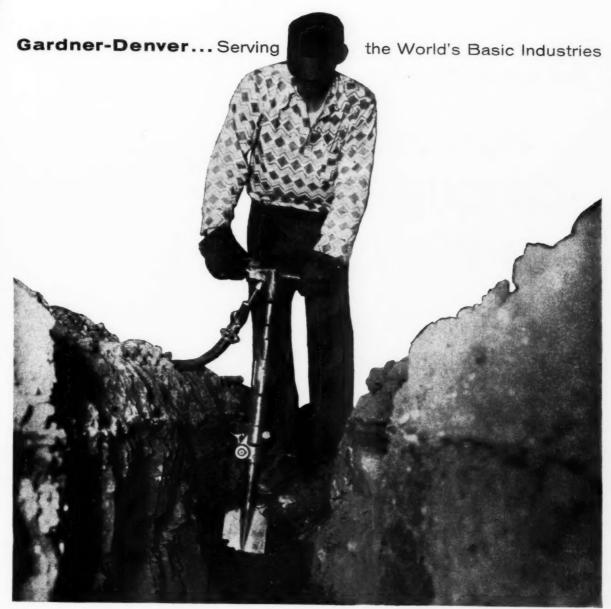
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Write us today for new RailAid bulletin:

KOEHRING



KOEHRING COMPANY,



Model C127 trench digger goes to work.

Fast trenching . . . and lots of it



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Easy does it—with a G-D Paving Breaker.

Gardner-Denver Trench Digger cuts through heavy dirt and clay like butter. Gets a tough job done-fast. Every Gardner-Denver maintenance tool is designed to save time . . . built to stand the gaff and stay on the job.

Trench diggers • Clay spaders • Paving breakers • Sheeting drivers • Rock drills · Utility drills · Backfill tampers · Air hoists • Air line oilers • Sump pumps · Portable compressors to run them all. Send for descriptive bulletins.

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You saw it at the Track Show

NOW SEE IT ON YOUR OWN M/W JOBS!



Gradall, equipped with Self-Compensating Guide Wheels, easily rides across frogs, switches and crossings.



Cleaning drainage ditches, working right from roadbed. Gradall's accurate, fast digging action slashes costs on this type of work.



Complete control of Gradall's telescoping, arm-action boom and the wrist-like action of the bucket enables operator to grasp and remove even large boulders.



No traffic interruptions with a Gradall! When the way must be cleared, the Gradall simply strad dles or moves off track while train



Quickly back on the job! Gradall cleans culvert openings, working in close around culverts, without damaging pipe, maintaining proper



Off to the next job-right down the roadbed, with ample clearance for passing trains. Where tracks are closer together, Gradall can straddle track.



Gradali makes fast work of clearing a rock slide. A special rock bucket, attached in less than 5 minutes, easily handles large rocks.



Aligning track on curve, Gradall exerts its powerful hydraulic pressure—pushing or pulling—properly positioning track without moving hallate



Laying rails, Gradall is used as a crane to quickly and accurately position rails. This is just another of the many "bonus" railroad jobs handled by Gradalls.

Write for a demonstration:

GRADALL DIVISION, WARNER & SWASEY CO.

Cleveland 3, Ohio

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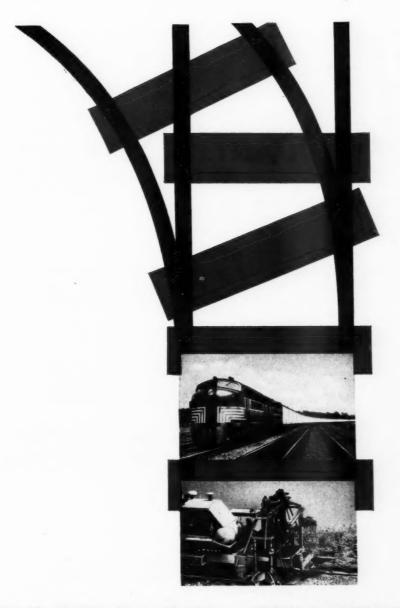
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HAULING A LOAD...REPAIRING THE ROAD

ESSO DIOL RD 77—Specifically developed for the heavy-duty engines of modern locomotives, Esso Diol RD 77 assures peak efficiency and long, trouble-free engine performance—high standards that mean extra lubrication economy.

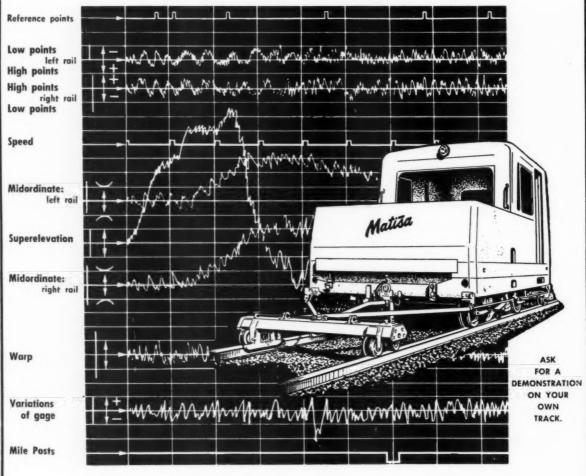
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NOW Matisa BRINGS YOU OUALITY CO

THE NEW MATISA TRACK INSPECTION CAR . . . is a complete mobile instrument for the accurate measuring and recording of track conditions, and the detection and locating of track defects.



The Matisa Track Inspection Car enables track-maintenance officers:

- (1) to record quickly and precisely the condition of track prior to starting programmed work;
- (2) to verify the effectiveness of completed work programs;
- (3) to maintain a graphic record of frequent inspections;
- (4) to create incentives for supervisory officers, foremen and men.

Matisa EQUIPMENT CORPORATION

1020 WASHINGTON AVENUE . CHICAGO HEIGHTS, ILLINOIS

News Notes

... a resumé of current events throughout the railroad world RAILWAY

TRACK and STRUCTURES

DECEMBER, 1956

A long-term wage settlement has been agreed upon by the nation's railroads and 11 non-operating unions. A moratorium until November 1, 1959, was established on wage increases, decreases and other matters relating to compensation. Railroad representatives placed the first-year cost of the agreement at \$330 million when extended to cover both non-operating and operating employees, and said the two 7-cents-an-hour increases included in the agreement (one in 1957, the other in 1958) will add \$185 million yearly to railroad operating costs. The settlement concluded efforts begun October 2 by the National Mediation Board.

Piggybacking is growing so fast that it will give the railroads an extra \$600-million income annually "within a very few years," according to Deodat Clegjan, president of Piggy-Back, Inc. Eugene F. Ryan, president of the Rail-Trailer Company, went even further and predicted the railroads could gain \$1 billion a year in new revenue through T-O-F-C operations. Joining Mr. Ryan in his prediction were H. W. Von Willer, president of the Erie, and Roy Freuhauf, president of the Freuhauf Trailer Company.

Southern railroads have joined the eastern and western roads in asking the ICC for a 7 per cent interim freight rate increase to offset the recent advances in wages and higher material costs and to obtain funds to continue their capital improvement programs.

Carriers are "wasting a lot" of money in "non-productive expense"—some advertising and public relations activities—declared ICC Chairman Arpaia. The public, he said, cannot be expected to pay for such "fanfaronades."

Mergers in the next 15 to 20 years will leave the United States with about 25 strong, consolidated railroad systems—according to a prediction recently made by Robert S. Macfarlane, Northern Pacific president.

Net income, after interest and rentals, of Class I railroads in the first nine months of this year was down \$51 million from the corresponding period in 1955. September net of \$79 million was \$2 million below September '55.

Railroad construction activity was up 17 per cent in the first ten months of this year as compared with 1955. October activity totaled \$41 million compared with \$40 million in September and \$39 million in October 1955. Ten months' total for 1956: \$360 million.

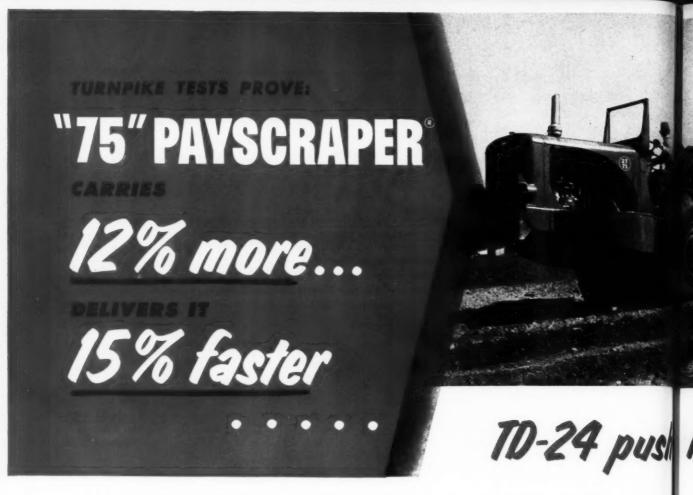
Acquisition of the TP&W by the Santa Fe and the Pennsylvania was recently recommended as "consistent with the public interest" by ICC Examiner Paul C. Albus.

RAILWAY TRACK and STRUCTURES

CTURES

DECEMBER, 1956

9



An International TD-24 tractor and "75" Payscraper recently out-pushed, out-loaded, and out-sped all equal-sized competitive units in accurate on-the-turn-pike tests. This data was obtained on the Illinois toll road job near Rockford.

All tests were conducted under similar conditions on the same cut, in the same material, and under the supervision of the contractor's grade foreman. Loading time was limited to exactly one minute. Scraper loads were weighed on special new accurate scales. Haul length was held to 2,000 feet for all scrapers.

Final figures amazed all observers! Results showed first, that the "75" Payscraper carried 12% more dirt per load...delivered it 15% faster than the other two scrapers tested; second, that the TD-24 torque converter pusher heaped an average of 1.2 cu yd extra

Load-Speeding Action. High horsepower-to-weight ratio and speeds up to 24 mph—plus operating ease of air-assisted clutch; big, safe, 4-wheel air brakes; exclusive Hydro-Steer—all help the Payscraper gain time, increase earth-moving capacity!

into all scrapers tested. (See charts, at right.) A competing manufacturer substantiated these same figures!

Here's conclusive proof that no matter what scraper the TD-24 pushes, you load more in any given time... and that the "75" Payscraper carries more, no matter what pushes it! And that the TD-24 and "75" Payscraper, teamed together, out-produce other equipment combinations with faster loading, bigger loads, and all-around faster cycles.

Prove that International Payscraper units and TD-24 tractors can give your railroad the same high bonus performance in reducing grades, removing land-slides, day-lighting curves, building spur lines and in all kinds of off-track earthmoving jobs. See your nearby International Construction Equipment distributor for a demonstration.

Clipboard in Hand, equipment engineer signals "75" to begin controlled one-minute push-loading from TD-24 torque converter tractor. Although TD-24 push-packed an average 1.2 cu yd more in all scrapers, it loaded 2.1 cu yd more in "75" Payscraper, than competing pusherl







us loads 1.2 extra yds. into all scrapers!

PAYLOAD TESTS (average)

CYCLE TIME TESTS (average)

Pusher	International "75" Payscraper	Scraper "A"	Scraper "B"
International TD-24 Torque Converter tractor	20.6 cu. yd.	18.2 cu. yd. "75" bonus 2.4 cu. yd.	17.5 cu. yd. "75" bonus 3.1 cu. yd.
Pusher "A"	18.5 cu. yd.	17.0 cu. yd. "75" bonus 1.5 cu. yd.	17.1 cu. yd. "75" bonus 1.4 cu. yd.

International "75" Payscraper	4.8 min.	1
Scraper "A"	5.7 min.	}
Scraper "B"	5.6 min.	1

"75" Paystraper
Proves 15% faster
...delivers up to
19 extra loads
per 10-hour day

See you at the ROAD SHOW-CHICAGO Jan. 28-Feb. 2, 1957



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INTERNATIONAL Construction Equipment

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Side-Seem Tracters . . . Self-Propelled Scrapers and Settem-Dumps . . . Crawler and Rubber-Tired Leaders . . . Off-Highway Trucks Divisel and Carbureted Engines . . . Meter Trucks



FIREPLATE protects simulated bridge from tumbleweed fire. This is a typical test conducted on coatings by the SANTA FE Railroad to determine their effectiveness.

POSITIVE FIRE PROTECTION Railroad Bridges • Telephone & Telegraph Installations

FIREPLATE provides:

- · positive protection against fire loss
- exceptional protection against drying, rotting and deterioration
- vast dollar savings on extensive weed control
- easy application



T. M. REG. PEND

ENTHUSIASTICALLY ACCEPTED BY RAILROADS COAST-TO-COAST

Now for the first time in the history of railroading, The FIREPLATE Division of The ZONE Company offers complete protection from fire for all types of structures constructed of wood

For the past 17 years, railroads have been protecting the horizontal surfaces on open deck bridges with the famous LIBBEY-ZONE Process. Now with the development of FIREPLATE, The ZONE Company makes complete protection for wooden trestles and bridges a reality.

The Santa Fe Railroad has played a very important part in the development of FIREPLATE. Through their full scale bridge test, FIREPLATE has proven its value for complete protection against fire. We are proud to announce . . . FIREPLATE HAS PASSED THE SANTA FE FIRE TEST, AND NOW—

THIS AMAZING PROTECTION IS AVAILABLE FOR YOUR RAILROAD'S SAFETY!

You may secure a personal representative to discuss your "FIRE RETARDANT" program without cost or obligation. Telephone or wire us collect, or write BOB PHILLIPS, GENERAL MANAGER.

Fireplate Division — The Zone Co.

P.O. Box 789 — FORT WORTH, TEXAS





In your '57 planning
...be sure to consider
these 5 NEW NORDBERG
"Mechanical Muscles"

From the time the first Nordberg Track Maintenance Machine was introduced over a quarter-century ago to the present day... America's leading railroads have made Nordberg "Mechanical Muscles" the standard by which modern maintenance machinery is compared.

As with all of the more than twenty-five Nordberg "Mechanical Muscles," these five new track machines have been designed, built, tested and proved with the cooperation of railroad men. This is further evidence of progress and constant assurance that Nordberg will continue to serve you better with an ever increasing line of dependable maintenance machines.

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The NEW NORDBERG BRONCO . . . A propulsion unit for the Dun-Rite® Gaging Machine and Pregager. Single, power driven crawler tread runs on the top of ties. Reduces men required in Dun-Rite Gaging operation from five to three.

The NEW NORDBERG SURFRAIL GRINDER . . . Latest addition to the well-known Nordberg Rail Grinder line is a one-man, lightweight machine for such jobs as removing mill tolerance, leveling cropped rail and surface grinding rail ends or wheel burns which have been welded.

The NEW NORDBERG SELF-PROPELLED ADZER . . . Self-propulsion is now available for the Nordberg Adzer, making it a truly one-man machine. Self-propulsion increases production of ties adzed per cutter head, increases operator safety, and produces more accurate adzing.

The NEW NORDBERG BANTAM RAIL SLOTTER . . . Rails requiring cross grinding can be quickly slotted to prevent chipping by the new Bantam Rail Slotter. This compact, completely portable one-man machine uses 8" diameter grinding wheels of varying thicknesses.

The NEW NORDBERG TAMPING POWER JACK . . . Combines features of the Nordberg Power Jack and Gang Tamper. For use ahead of gang tamping equipment, the self-propelled Tamping Power Jack raises track quickly, and solidly tamps ties to hold raise.

NORDBERG MFG. CO., Milwaukee, Wisconsin NORDBERG MFG. CO., Milwaukee, Wiscons

Send further	details on:	☐ BRONCO
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BANTAM RA	IL SLOTTER TAM	PING POWER JACK
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...a leader...in using new and better materials, methods, and tools

uses WESTERN

FORMERLY BUDA

RAIL BENDERS

...in maintaining 13,000 miles of track



It takes some doing for the Santa Fe to serve the whole Southwest from Lake Michigan to the Pacific and the Gulf... and keep ahead of or abreast of its competition. There is constant maintenance and modernization, the building of new yards, bigger yards and new industrial spurs. Naturally, this calls for installation of new switches... and all along the entire Santa Fe System, WESTERN (formerly Buda) Rail Benders are being used.

WESTERN MODEL NO. 130 JACK TYPE RAIL BENDER

Shown in use during modernization and expansion program at Corwith Yard, Chicago

- **1.** Only hand operated bender made that will bend 152-pound rail cold.
- 2. Ball bearing journal jack facilitates easy operation by one man.
- 3. Scale on jack ram (graduated by 1/4") assures accurate duplication of bends.
- **4.** Lighter weight than any similar benders of same capacities.
- 5. Safe-does not slip or bind.
- **6.** Saves time and money—stock rail and guard rail bends can be made in the field:

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Look!
No weeds.

Weed Control is no chore...when you use new

EFFECTIVE ... ECONOMICAL

UREABOR

WEED and GRASS KILLER



Applications of UREABOR are almost effortless

NOTHING TO MIX - NO WATER TO HAUL

There's no easier way to end weeds for a season or longer! That's why UREABOR has been such an instantaneous success with all types of industry. You, too, will want the effective and lasting destruction of plant-life offered by this newest addition to our line of nonselective herbicides.

UREABOR is a granular urea-borate combination in dust-free form for fast, easy application at low rates. This chemical destroys weeds and grasses through their root systems. Its residual action, preventing regrowth for long periods, helps hold manhours for "grassing" to a minimum.

UREABOR has desirable features. It's concentrated, nonflammable, and nonpoisonous when used as directed. Easy to apply—just a man with a special PCB Spreader can be effective anywhere.

Write today for literature!

Dry application—like this—destroys weeds and grass...prevents regrowth for a season, or longer!

Special Spreader now available for fast, easy application...

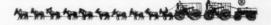
The PCB Spreader applies UREABOR to best advantage, at prescribed low rates. It holds enough UREABOR to treat 1250 to 2500 sq. ft. without refilling—weighs a mere 6 lbs. Available now for just \$10.75 delivered—anywhere in the U.S.A.



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PACIFIC COAST BORAX COMPANY DIVISION
630 SHATTO PLACE, LOS ANGELES 5, CALIFORNIA





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D Tournapull...the "Railroad Handyman"

One man and a "go-anywhere", rubber-tired, 138 hp D Tourn-apull-Scraper can handle most of your dirtmoving on maintenance and construction projects... at a worthwhile saving in time, money, and manpower.

"D" drives anywhere under its own power via track, right-of-way, or public highway... without damage to track, right-of-way, roads, or unit's tires. 29.5 mph rig often handles several jobs over 50-mile radius in a single day. Big 7½-yard capacity scraper moves large quantities of earth, gravel and ballast quickly... without interruption to traffic or work.

Handyman "D" self-loads, hauls, spreads material... can also be push-loaded. It cleans ditches, builds up shoulders and embankments, slopes banks, fills washouts, spreads ballast, grades right-of-way. On construction work, Tournapull makes cuts and fills, finishes to grade, digs ditches, hauls and spreads ballast. With bulldozer blade, rig aids pioneering, handles miscellaneous dozing, and backfills.

Interchangeable optional trailunits give added utility as reardump, lift-and-carry crane, flatbed hauler. V-type snowplow busts drifts, clears sidings, opens roads, yards, parking areas.

138 hp D Tournapull-Scraper on the Atchison, Topeka, and Santa Fe Railway spreads fill to restore and reinforce embankment near Willard, N.M.

In the decade ahead...You'll save time, cut costs, with more off-track machines on rubber

Times change, Railroad problems change too.

Increased earnings go to roads that anticipate and modify methods, to meet today's and tomorrow's needs.

You have successfully met the challenge of the 40-hour week — by increase in mechanization. Today manpower shortages and high labor costs challenge you with similar new problems in your maintenance-of-way and switching operations. Both problems may be solved to a great extent through increased use of fast, efficient off-track machines mounted on big, low-pressure rubber tires.

As you equip to further reduce costs and improve maintenance...to save time and dollars on grading for new sidings and service trackage...and to speed up switching service in congested yards and on remote sidings...be sure to carefully study the line of rubber-tired machines offered by LeTourneau-Westinghouse, a subsidiary of Westinghouse Air Brake Company. Write for complete facts and figures on the cost-cutting machines illustrated here. Ask us to show you how off-track mobility, high work and travel speeds, and a big capacity for hard work can solve many of your problems of today and tomorrow.

Tournatractor ... 208 hp work-and-run tractor

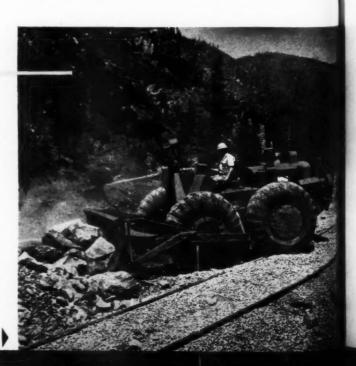
Speed construction work and scattered earthmoving jobs with this high-speed rubber-tired Tournatractor. No need to wait for work-train and a clear track. Operator just hops on and goes ... over tracks, pavement, bridges, right-of-way, or highways ... at 17 mph.

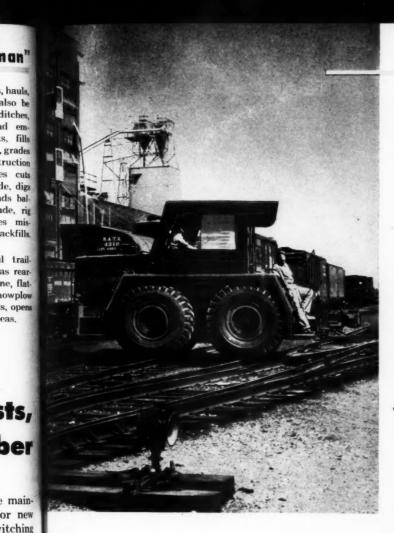
On the job, Tournatractor goes right to work without delay to rail traffic. Dozer blade carries 21/2 yds. in average material. Tractor push-loads scrapers, casts, backfills, clears landslides, cleans up yards and stockpile areas, plows snow. Tournatractor also pulls equip-

ment speedily, uproots trees, brush, cuts slopes, etc. Because of Tournatractor's greater speeds, it will out-work crawler-tractors of comparable horse-power on most assignments. Its 17 mph roadability makes it an ideal machine for RR work.

Tournatractor has 4-wheel drive, instant gear-change with constant-mesh transmission, torque converter, powerful 4-wheel disctype air brakes, and fast, finger-tip electric control of blade and power-control-unit. List price FOB is approximately 10% less than crawler-tractors with similar engine horsepower.

Tournatractor dozes blasted rock over bank in scaling operation along moun-





SwitchMobile . . . off-rail switcher on rubber

Here's an off-track, diesel switchengine that speeds-up movement of cars in busy freight yards. It works alone or as an auxiliary ... handles spotting and moving of odd-lot cars.

SwitchMobile works and travels on rubber tires, is not tied to rails. When needed on another track, it travels direct. No need to clear tracks or to shuttle back and forth through yards. Switcher crosses tracks...takes shortest route to next assignment... speeds to distant jobs at 16 mph. via track, right-of-way, or highway. SwitchMobile's big, lowpressure tires move onto ties . . . won't damage tracks, yards, switches...won't chamfer ties. Unit straddles rails . . . has 6'10" width between tires.

This 18-ton, 4-wheel drive switch-engine easily starts 1250 tons of standing rolling-stock... has full range of power and speed, forward or reverse. Its 208 hp diesel engine, through constant-mesh transmission and torque converter, produces 36,000 pounds of rimpull at wheels. Big, low-pressure tires grip ties and ballast... provide more tractive effort than steel-wheel switchers twice its weight.

Built to ICC safety standards, unit has regulation railroad controls, "dead-man" safety device, 360° visibility, seat and controls facing either front or rear. It is equipped with regulation standard AAR Type E couplers and air-brake lines front and rear, has standard RR fittings.

Pennsylvania Railroad uses 208 hp Switch-Mobile to move cars between yard and customer's sidings. Rubber-tired switcher maneuvers easily over spur tracks laid in city streets.

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Many maintenance and construction jobs formerly handled by hand-labor, shovel, or dragline crews, can be economically performed by one man and a modern Adams grader. There's no waiting for work-train... grader drives via highway or right-of-way, at up to 26 mph.

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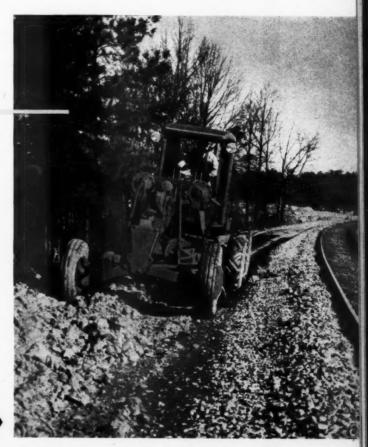
On construction work, an Adams steps-up production . . . pushes scrapers, cuts rough and finish

grades, shapes shoulders and embankments, slopes cut-sides, spreads fill, maintains haul roads, digs ditches, backfills.

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Adams grader spreads fill, widens shoulders, shapes for effective drainage along right-of-way of major U.S. railroad.



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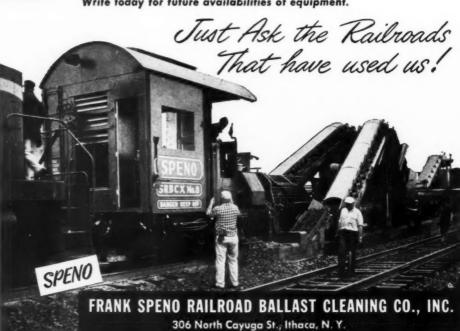


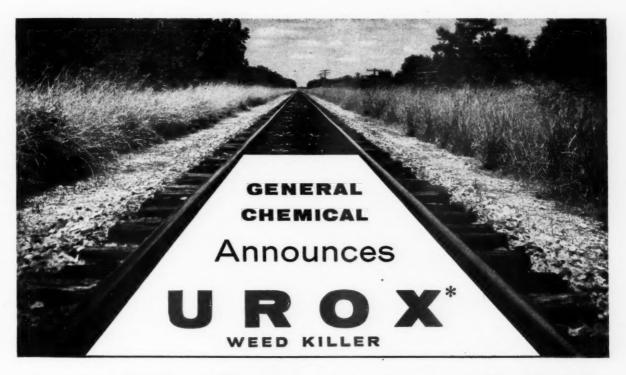












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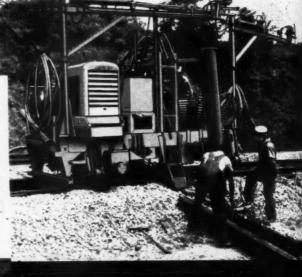
R.M.C. SPIKEMASTER spikes ties tightly against the rails, operating at better than six ties per minute.



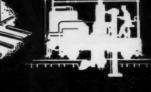
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 R.M.C. SpikeMaster nipping up the ties and driving four spikes.

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- McWilliams Ballast Distributor placing ballast in perfect position for tamping.
- McWilliams Tie Tamper with split head using controlled pressure to compact ballast under the ties.
- R.M.C. LineMaster aligning the track by moving it horizontally in either direction.



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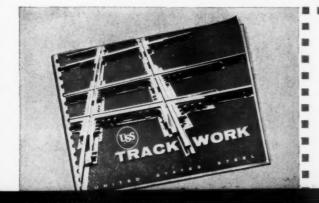
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RAILWAY

TRACK and STRUCTURES

Subject:

Dear Readers: **Problem with Many Answers**

What is the best type of basic organization for the track-maintenance forces? This question is on the minds of a lot of track men these days, and many of them have come up with what they believe to be the right answers. A significant thing about these answers, however, is that hardly any two of them are in complete agreement with each other.

At one extreme are those roads that feel the conventional section-andextra-gang setup will continue to give the best results under today's conditions. Many such roads have lengthened their sections and reduced the size of the gangs but they have left the basic organization relatively undisturbed. At the other end of the scale are roads, comparatively few in number, that have done a complete job of reorganizing their track forces, even to the extent in some instances of eliminating section gangs. Opinion on the majority of roads is somewhere between these two extremes.

Agitation for revamping track-force organizations has arisen in the first place because the underlying conditions affecting costs have undergone significant changes. Higher wages have sparked the development of new and better machines. The most effective use of at least some of these machines requires that they be placed in the hands of district, regional or system gangs. It is probably true that most, if not all, of the heavier work could be done by such gangs, some of them operating on a cyclical basis.

Doubtless there isn't too much disagreement on this point. The disagreement comes when we get into the question of what type of local organization is needed to do the work not taken over by the out-of-face gangs. How can patrolling and the minor, but necessary, jobs be handled? And how much of a local organization is needed to handle emergencies—derailments, washouts, snowstorms?

While track men are grappling with these questions they must also be thinking about a couple of other important matters, both of which have a significant bearing on the problem. One is the difficulty of finding qualified men to take the job of foreman—a problem that would be less acute if there were fewer such jobs to fill. The other is the growing pressure to achieve a greater degree of stabilization of the maintenance forces. Railroads can hardly afford to overlook this important consideration when considering plans for revamping the basic M/W organization.

To these considerations it is necessary to add the complications introduced by variations in climatic conditions and by differences in the volume and character of traffic.

When consideration is given to all these different facets of the problem it is not surprising that the answers vary widely between different roads. They even vary on the same road. For instance, maintenance officers on the C&O can cite perfectly logical reasons why they have four entirely different types of track-force organizations on this one system, depending on traffic, geographical and climatic conditions.

This is one of those situations where it just isn't possible to say this is right and that is wrong. But it is important to recognize that conditions have changed—are still changing—and that the type of maintenance organization that gave the best results a few years ago may be entirely inadequate today.

MHD

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ALL ALONG THE LINE

THIS RACOR TEAM EXTENDS TIE LIFE REDUCES SPIKING COSTS



THE RACOR STUD (Patented)

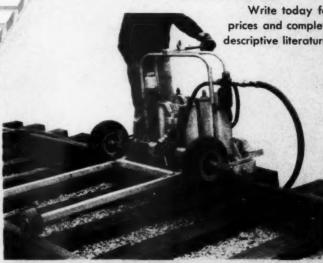
Securely driven becomes integral with tie plate and restricts lateral movement effectively. This adds up to greatly reduced tie abrasion, a reduction of spike killed ties and a minimum of tie splitting. In addition to this extension of tie life, Racor studs pay off handsomely in reduced track maintenance. Because these sturdy anchor studs maintain better line and gage, they defer tie replacement, and they reduce labor costs. Many tests have shown a reduction of 50% in tie wear. Put Racor studs to work on your road. They'll pay big dividends all along the line.

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(Patent applied for)

The DD-4 will drive Racor studs in the anchor position of tie plates and will effect substantial savings in line spiking costs. Studs or spikes are distributed in tie plate holes by hand. The DD-4 drives two studs or spikes simultaneously, then resets automatically for the next two. It has the advantage of two powerful pneumatic hammers, yet one man can drive twice as many studs or spikes without relief or fatigue. Take advantage of these time and cost-saving benefits. The DD-4 will prove well worth your while all along the line.

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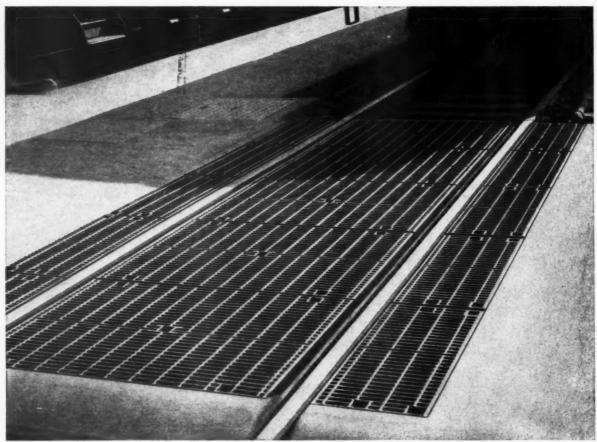
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DECEMBER, 1956

31

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RAILWAY TRACK and STRUCTURES



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"No maintenance at all. We haven't done a thing to them...except drive over them"

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What they drive over them, some 50 times a day, are three 4,000-pound lift trucks carrying about 4,000 pounds of brake shoes. Plus other vehicles, such as heavy ladder trucks.

These prefabricated sections of Blaw-Knox Steel Grating are easily installed. Open mesh self-cleaning construction permits good drainage, quick evaporation of snow and water. Sections may be removed individually, without halting traffic flow.

Whether they are used for yard or road crossings, Blaw-Knox Electroforged Steel Grating Crossings last as long as the rails.

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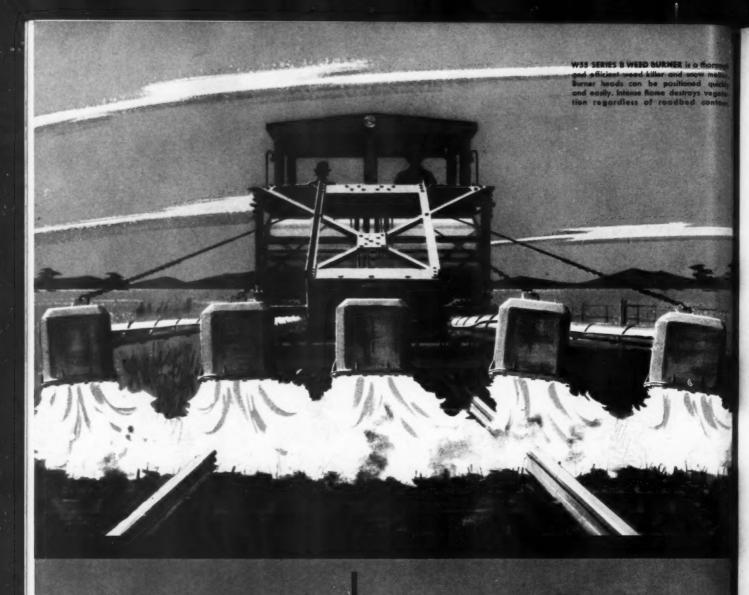
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CONTRACTOR: Construction Aggregates Corp.

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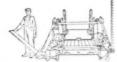
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RAILWAY

TRACK and **STRUCTURES**

DECEMBER, 1956

Vol. 52, No. 12

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THE SANTA FE ...

Panoramic View of MW Policy

The entire feature section of this issue is devoted to an analysis of the maintenance-of-way and structures operations of a single railroad—the Santa Fe, Just a year ago the Erie was treated in a similar manner.

The objective in each case has been to present, to the extent it is possible to do so in the space available, an overall view of the policies and practices followed by the subject road in the construction and maintenance of its fixed properties.

It is not only felt that readers on other roads will find the analysis of unusual interest but that they will thereby have an opportunity to make direct comparisons between their own practices and those of the railroad under investigation.

The treatment does not, in any sense, attempt to glorify the particular road. Basically the purpose is to present factual information in a matter-of-fact manner. But it is conceivable that a too-literal interpretation of this principle could result in dull and colorless reading. The editors have, therefore, been alert to possibilities for dramatization with the result that, here and there, emphasis has been placed on practices or developments that appear to be particularly interesting, unusual or outstanding.

Among maintenance men on

Facts About Santa Fe Operations in 1955

Total railway operating revenues	\$578,034,019
Maintenance of way and structures expenses	82,562,952
Maintenance of way ratio	
(including roadway depreciation)	14.3 per cent
Ton-miles revenue freight per mile of road	2,539,273
New rail laid in replacement	
Crosstie renewals	1,544,697

Mileage as of December 31, 1955

Total main tracks	 13,146.92 miles
Total all tracks	 21,672.32 "

other lines the Sante Fe is regarded as a progressive road, capable of independent action in adopting new standards, practices and equipment. Doubtless much will be found in these pages to confirm this notion. Witness, for example, its adoption years ago of the 9-ft tie as standard practice and, more recently, the policy of butt-welding all new rail into continuous lengths.

Another facet worth mentioning is the aggresiveness shown by this road in devising special equipment or devices. It has a long list of such developments to its credit, many of which are solely a product of the road's own efforts, while others were brought to fruition in collaboration with independent manufacturers.

The Santa Fe is a relatively prosperous road. Also it has high standards of maintenance. From these facts there may be a tendency to deduce that maintenance money comes easy. It doesn't. A dollar has the same value on this road as elsewhere, and every budget item must not only pass through a formidable gamut of critical eyes, but it must be accompanied by proof that there is a pressing need for it.

We acknowledge with deep appreciation the spendid cooperation extended by the Santa Fe in the preparation of this issue, particularly the many fine photographs that were made available to us for the purpose of illustrating the various articles.

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Maintenance of way and structures expenses	
Maintenance of way ratio	
(including roadway depreciation)	
Ton-miles revenue freight per mile of road	
New rail laid in replacement	73 track-miles
Crosstie renewals	1,544,697

Mileage as of December 31, 1955

Total main tracks	 13,146.92 miles
Total all tracks	 21,672.32 "

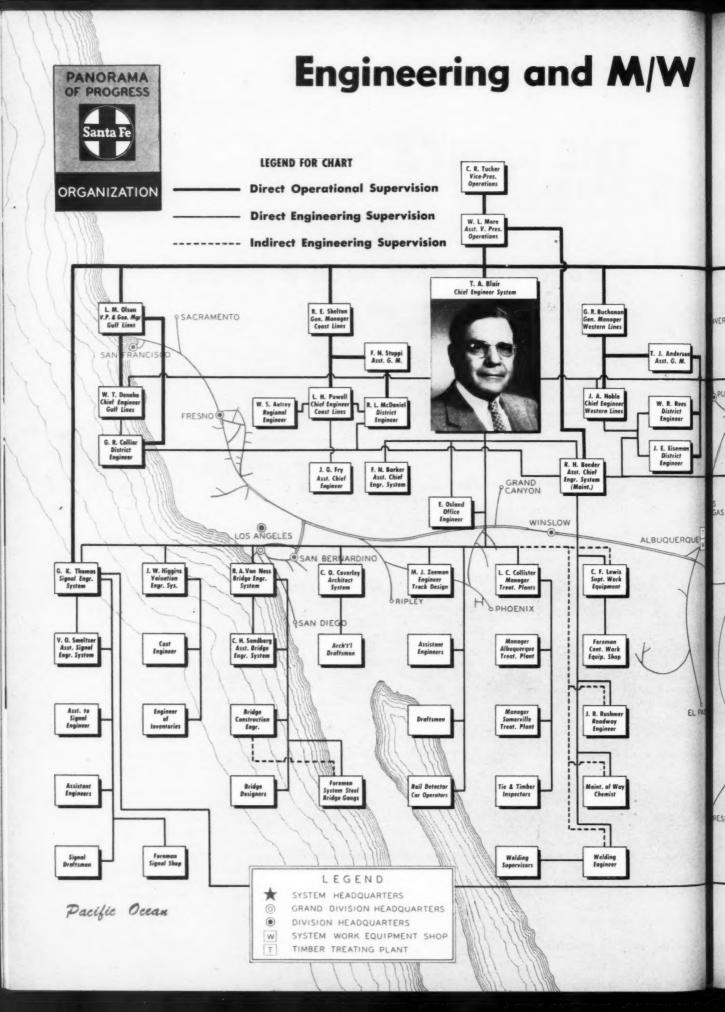
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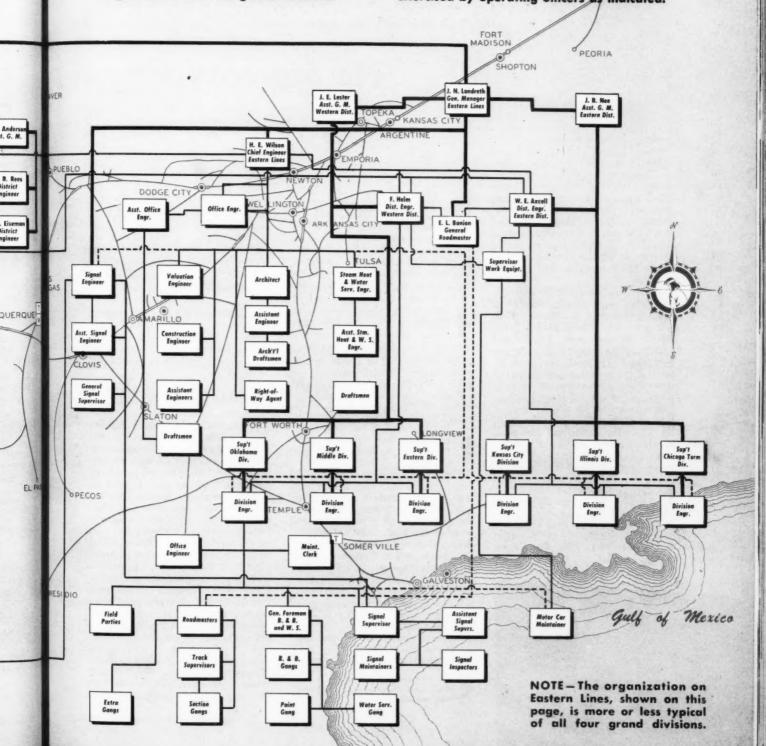
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Supervision over maintenance matters is delegated to an assistant chief engineer system who deals directly with the district engineers on the grand divisions.

On both construction and maintenance matters parallel lines of supervision are exercised by operating officers as indicated.





You can't tell a book by its cover, but you can judge a railroad by its standards. The up-to-date materials and practices employed on the Santa Fe make it possible to say there are . . .

RAII

The Santa Fe's current standards call for the laying of continuous welded rail on the road's heavy-traffic, high-speed transcontinental main lines. In general, such rail will be Colorado Fuel & Iron's 136-lb section. Depending upon traffic density, speed and physical conditions, CF&I's 119-lb or relayer rail is destined for the remainder of the system. In branch line tracks, second-hand rail is generally used as it becomes available from main-line relays—the heavier sections going to those lines carrying the greater tonnage.

In the road's main transcontinental routes, the following weights of rail are presently in service: 136-lb—1 per cent; 132-lb—21 per cent; 131-lb—34 per cent; 112-lb—29 per cent; and, 110-lb—1 per cent. In jointed track (some 400 miles of main line track is now welded—see p. 46), all of the 115-lb and 119-lb. rail is punched for 6-hole bars, as is most of the rail heavier than 110-lb. All of the 110-lb rail and most of the lighter sections found in secondary trackage and in yards are punched to receive 4-hole bars.

JOINT BARS

Toeless joint bars, 36 in long with 6-hole punching and head easement, are used with the 136-lb,



... No Stereotyped Standards

132-lb, 119-lb and 115-lb rail sections. The same type bar, without the head easement, is used with the 131-lb rail. The 112-lb rail has been laid partly with 36-in, 6-hole toeless bars and partly with 24-in, 4-hole toeless bars. All of the 110-lb rail is laid with 24-in, 4-hole toeless bars. Joint bars used with the lighter weights of rail are of various types.

BOLTS

Track bolts 1 in. in diameter are used with all rail of 110-lb section and heavier. Power wrenches are used in all out-of-face rail work and are set to tighten the bolts to a predetermined tension in accordance with AREA recommended practice.

TIE

Hardwood ties, including oak, beech, gum, hickory, maple and walnut, are standard for all main track curves of 1 deg and over for the road's main transcontinental routes. On the mountain grades they are also standard for tangent track. Main-line transcontinental track uses 7-in by 9-in by 9-ft ties in both curve and tangent territory. On the less important main lines, 9-ft ties are used only on curves of 1 deg or over. Eight-foot ties are used on all other tracks.

Ties are treated at the road's tie treatment plants (Somerville, Tex.,

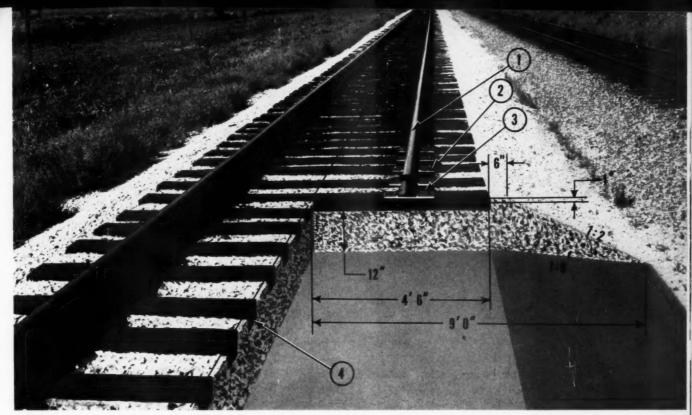
MT. PISGAH, the Santa Fe's source of volcanic cinder ballast, as viewed from the air. and Albuquerque, N. M.), with a 30-per cent creosote and 70-per cent residual oil formula, with a 12-lb per cu ft retention. Facilities have been installed to Vapor Dry all hardwood ties for main track use (see p. 62). Hardwood ties to be Vapor Dried are no longer incised.

ANCHORS

The Santa Fe uses conventional types of rail anchors applied on the basis of 16 per 39-ft rail panel in jointed territory and 24 anchors per 39-ft rail in continuous welded territory.

BALLAST

Inasmuch as the Santa Fe covers an extensive territory, several different types of ballast are used. For all crushed ballast, AREA specification No. 5 is followed, providing ballast in the range from 1 to 3/8 in. In the Chicago to Kansas City region, standard ballast is slag from the Gary steel mill region, although some crushed dolomitic rock is also employed. Other materials used and their sources of supply include: Chat from the Tri-State mining district of southeastern Kansas, Okla-homa and Missouri; slag from Pueblo, Colo.; quartzite from Sais, N. M.; limestone, obtained from Brownwood, Tex., and Dougherty, Okla.; granite from Piedra, Cal., and volcanic cinders from Winona, Ariz., and Pisgah, Cal. The Sais, Winona and Pisgah supplies are owned by the Santa Fe and the latter two sources are operated by the



STANDARD CROSS SECTION for heavy-traffic, high-speed main line track. Roadbed incorporates 12 in of ballast beneath ties. Physical components of the track structure include: (1) 136-

lb CF&I rail, welded into continuous lengths; {2} Racor studs, used for anchoring tie plates {2 per plate}; {3} 14 x 7³/₄-in tie plates; and {4} 7-in by 9-in by 9-ft hardwood crossties.

railroad. The road prefers to use the volcanic cinder ballast in those regions that receive very little rainfall.

SPECIAL TRACKWORK

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No. 20 turnouts are used at the ends of double track, CTC passing tracks and for high-speed crossovers. No. 14 turnouts are used for medium-speed crossovers and passing tracks. The No. 10 turnouts are standard for low-speed turnouts and yard leads. Only where restrictions prevent the use of a longer turnout are No. 8's used. A No. 24 equilateral turnout will be installed shortly for test purposes at the end of a section of double track in high-speed CTC territory.

The lengths of switch points used with Nos. 8, 10, 14, 20 and 24 turnouts are respectively: 16 ft 6 in; 16 ft 6 in; 22 ft; 30 ft; and 39 ft curved. The Santa Fe's standard for 119-lb and 136-lb switch points calls for manganese steel tips on the diverging traffic point. Where extensive point wear has been experienced with lighter rail sections, manganese tips are also specified. Switch point guard devices are not used inasmuch as the manganese tips are designed to provide sufficient durability. All frog guard rails are of the bolted type, fabricated in company shops.

The turnouts, predominately Nos. 10 and 14, which are used in main track normally employ spring rail frogs wherever the traffic is mostly over the main track. Where there is a more equal distribution of traffic between the main and the turnout track, however, railbound manganese frogs are used. Heavy-duty railbound manganese frogs are used exclusively in high-speed No. 20 turnouts. In the No. 8 and No. 10 turnouts used in yards, "RBM" frogs are used in the heavily-travelled yard leads-lighterduty tracks use bolted rail frogs. A comparatively few self-guarded frogs are used.

RAIL LUBRICATORS

Flange oilers, principally of the Racor and Meco design, are used at those selected locations where the transposition of rail because of curve wear has been most frequent—rather than on any basis of curve degree or length.

JOINT LUBRICATION

Rail-joint lubrication is accomplished mainly by the intrusion method. Joint spray machines, such as the Fairmont W72-A, are assigned to each division and spray oil between the bars and the rail

on all main line trackage on an annual basis. Where corrosion is unusually heavy, joint bars are removed periodically and a smear lubricant is applied.

TIE PLATES

For use with 136-lb rail, the Santa Fe has adopted the 7 3/4-in by 14-in (AREA design No. 12, punching A) flat-bottom tie plate. The 119-lb section is laid with 7 3/4-in by 13-in (AREA design No. 7) flat-bottom plates on both tangent and curved track.

GAGE STANDARDS

The standard gage of 4 ft 8 1/2 in is maintained on all tangent track and on curves of 6 deg or less. In curvature over 6 deg, the gage is widened 1/8 in per each additional degree of curve, to a maximum of 4 ft 9 1/2 in. Gage, including widening due to wear, is never allowed to exceed the latter figure.

SPIKES

The Santa Fe uses 5/8-in by 6-in high-carbon cut spikes for line spiking. Racor studs are standard for plate-hold-down. Two line spikes and two studs are used per plate on both tangent and curved track.

Teamwork produces 500 tie renewals per day



SPIKE PULLER is first ma-



TIE REMOVER pushes old tie out. Before the



. . TIE-BED SCARIFIER cleans out the crib balast. The new tie is then inserted by a . . .

The Santa Fe has a reputation among M/W men of being one of the nation's more progressive roads. By reviewing some of their . . .

...Advanced Trackwork Techniques...

. . . we can see how they gained this reputation and how they are able to maintain it.

• As with many railroads, the greatest possible mechanization of track gangs on the Santa Fe has contributed greatly toward economical and efficient maintenance. Add to this factor a fertile ingenuity (many track machines now in use throughout the country were originally developed on the Santa Fe) and the ability to plan and schedule work wisely and thus effectively, and you have a pretty good picture of why the road's M/W department is held in high esteem.

TIE RENEWALS

Tie insertions for replacement purposes run from 1,200,000 to 1,500,000 per year. For the most part, this mighty respectable number of ties is inserted by the 300-odd men who make up the road's eight mechanized tie-renewal gangs. Here's how it's done:

As a general average ties are renewed on a three-year cycle. Tie inspectors, under the direction of L. C. Collister, manager of treating plants, work in advance of the renewal gangs, marking those ties to be renewed. No attempt is made on the part of these inspectors to determine how much life is remaining

in a tie. The road's established policy reads:

"Ties to be selected for renewal by the tie inspectors should be those in need of renewal at the time of the passage of the mechanized tie gang and should not include those that look like they will fail within a few years." The ties removed from track in this program, needless to say, are not re-used elsewhere. The ties that are really "gone" are burned. Others are sold for from 10 cents to 25 cents each; some are used for fuel by section men.

Under present conditions the three-year cycle provides a minimum of 250 tie renewals per mile.

Surfacing is done on an 8 to 10-year cycle



TRACK MAINTAINERS, operated in tandem, are employed by the Santa Fe on a "cycle" basis and "skin-lift" the track about $1\,1/_2$ in.



. . . TIE HANDLER. Plates are then reapplied and spiked. Anchors are replaced after which . . .



. . . HYDRA-QUADS spot-tamp the new ties. Gangs average about 500 tie renewals per day.

Where surfacing work is scheduled (and bad ties may run less than 250 per mile) those ties in need of renewal will be handled by the surfacing gang.

The mechanized tie-renewal gangs cover about two miles a day. Each gang has in the neighborhood of \$34,000 worth of equipment at its disposal. A typical mechanized tie gang consists of a foreman, a timekeeper, five machine operators and 34 laborers. Labor cost per tie renewed is between \$0.85 and \$1.25.

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Normal working procedure for a mechanized tie-renewal gang goes like this:

One laborer "peels" the old ties to remove any obstructions, such as deepcut edges, that might cause the tie to "hang up" on the rail base during the removal operation. Two more laborers follow removing small amounts of crib ballast under the rail to permit engagement of the hooks on the tie remover and also knocking off the rail anchors adjacent to the ties to be removed. A Fairmont hydraulic spike puller is next in line, manned by a machine operator who is assisted by a laborer. The spike puller is followed by a Fairmont rail lifter. The two laborers who accompany this machine remove the tie plates. Where the rail lifter is not available, the rail is raised with track jacks.

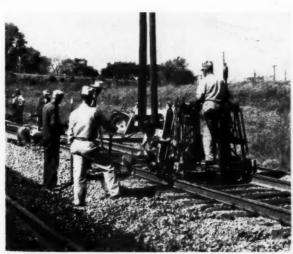
After the tie plates have been removed, a Fairmont tie remover pushes the old tie from the track and a laborer throws the removed ties off to one side. A Fairmont tiebed scarifier then cleans out the spaces to be occupied by the new ties. The new ties (previously distributed by work train) are placed

in position at one side of the track and are pulled into place by a Fairmont tie handler. Fourteen laborers follow, placing tie plates, setting, nipping and driving spikes, replacing rail anchors and forking in ballast. The spikes are driven with Ingersoll-Rand pneumatic drivers powered by a 4-tool, 36-cfm, I-R rotary compressor.

The new ties are then tamped up by two Racine Hydra-Quad tampers, each manned by a machine operator. Laborers follow the tampers dressing the track. Four laborers are employed lining the the track as needed after passage of the gang. Where available, lining machines are used for this function.

Other than the tie renewals made by surfacing gangs and those made

MORE ON NEXT PAGE

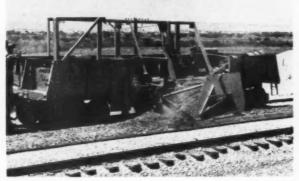


POWER JACK is used with large surfacing gangs making heavier raises. The gangs normally use a single production-type tamper.

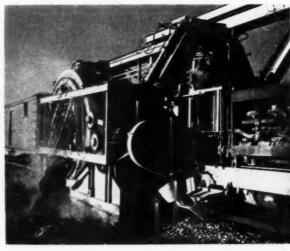


BALLAST SHAPING CAR dresses the ballast to the proper section after the raise has been made.

Ballast Cleaning and Track-Skeletonizing Operations . . .



INTERTRACK ballast conveyor car, designed and built by the road, is operated in conjunction with the skeletonizing gang.



SANTA FE'S ballast cleaner, designed by the road's engineering department, performs all cleaning done on the system.

by section forces around station platforms, grade crossings, etc., the mechanized gangs handle all mainline tie renewals. The Santa Fe feels that in the future it may be possible to extend the present threeyear tie-renewal cycle as "nests" of bad ties, established in the past, are eliminated.

SURFACING

This question comes to mind: Wouldn't it be more economical to combine tie-renewal and surfacing operations into one cycle-as many roads have done? Santa Fe men question the economy of such a policy. They point out that the surfacing cycle on the Santa Fe's main tracks is from 8 to 10 years, depending upon traffic volume, cli-mate, etc. This work, they point out, is normally not compatible with the three-year tie-renewal cycle except perhaps every third

Trying to choose a cycle to meet both requirements-say a six year cycle-might result in surfacing too frequently or allowing too many bad cross ties to accumulate in track. Of course, in actual practice under these long cycles the tendency is to remove cross ties that have several years of remaining service life which has a value of about twenty cents per tie per year. As mentioned before, some tierenewals are handled by surfacing gangs, but this is done primarily on the basis that the track is jacked up and tie renewals can be made with economy.

Spot tamping and lining to correct minor irregularities so as to maintain the riding qualities of the tracks is handled by section forces. When it comes to open track, however, established surfacing gangs are employed. Two types are used.

Three "skin-lift" surfacing gangs have been set up on the Santa Fe -this number, however, is variable to meet requirements. These gangs add only a small amount of ballast to the track, making a raise normally in the neighborhood of 1 1/2 in. Two Jackson Track Maintainers are used in tandem with each gang. These gangs have proven quite effective and average some 9,000 ft of track per day. The cost: 5 to 6 cents a foot.

The gang is made up of a foreman, an assistant foreman, two machine operators, a timekeeper, and 30 laborers. The typical gang uses a Matisa jack carrier, working from the lead tamper. From 16 to 20 aluminum alloy, 6-in lift, track jacks are used in each gang.

The second type of surfacing gang handles the heavier out-of-face raises above 1½ in. An average of 12 of these gangs are operated from March to November. The labor force of these gangs often runs as high as 50 men due to the heavier raise and the inclusion of tie-renewal work. Ballast is distributed from the road's selective-type ballast cars (of which there are approximately 2,075).

Each gang operates a single pro-

duction tamper (the Santa Fe owns one Matisa, one McWilliams, and 15 Jackson's). Three machine operators are used in each gang. One operates the tamper, another a Nordberg Power Jack, and the third mans a Fairmont W-92 ballast shaping car which, with hydraulically-controlled plows and wings, handles the ballast from the side to center of the track and also finishes the track behind the gang. The road also has four Kershaw Ballast Regulators which it uses to dress long stretches of track behind the surfacing gangs.

In situations where the track is to be raised on the new ballast and where traffic conditions permit, an undertrack sled is often used with the regular tamping, shaping and

dressing equipment.

BALLAST CLEANING

The Santa Fe programs its ballast-cleaning operations on the basis of recommendations made by J. R. Rushmer, roadway engineer. A single ballast-cleaning machine, designed and built by the Santa Fe and operated by a six-man crew, does all of the road's ballast cleaning. The cleaner is hydraulically controlled and is operated in a work train. Depending upon the condition of the ballast, the moisture present, traffic delays and running time to and from work, ballast cleaning costs vary between \$41 and about \$300 per mile. For a seven-year period, during which accurate records were kept, ballast-



CRIBEX machine is employed to skeletonize track in those locations where traffic density prohibits the use of an undertrack plow.

cleaning costs averaged \$110 per track-mile. A supervisor, two operators, two assistant operators and a repairman—plus the work train crew—are required in the operation of the cleaner.

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The machine cleans both ballast shoulders simultaneously, replaces the cleaned ballast, dresses it and wastes the removed dirt-all in one operation. Operating speed of the cleaner varies from I to 3 mph, depending on the amounts of dirt and moisture present. Under good conditions, ballast may be cleaned in a single pass, but when excessive moisture is present, where the shoulders are weedy, or where sand and dust have accumulated to an extreme degree, from two to four passes of the cleaner may be required. In such cases, the volume of dirt removed often exceeds the volume of cleaned ballast returned to the shoulders.

The cleaning machine is identically equipped on either side. Separate control of each side is possible, however, to meet unusual conditions. In operation two large scarifier bars first cut a slot in the ballast section at either side of the track just outside the ends of the 9-ft ties. Automatic tie blades, which follow the ends of the ties (from 8 ft to 9 ft in length), cut larger slots and windrow the ballast into position for pick up by the large side wings which contain the elevating and cleaning equipment.

Each of these wings is equipped with a blade that cuts the roadbed slope and delivers the ballast to a series of buckets equally spaced around the periphery of a huge wheel. Within each wheel are mounted three decks of grizzly bars which are vibrated by the passage of ballast over them and which screen the ballast. Each of the lower two decks of grizzlies is equipped with a peaked metal cover and guide plates which channel the removed dirt to the dirt conveyor belts. The latter are mounted beneath the bars.

Mounted between these belts is a second belt which is reversible and which serves as an interconveyor. By means of this combination of belts, the dirt removed from the ballast can be wasted on either shoulder or on only one shoulderas in multiple-track territory. The cleaned ballast falls through the spaces between the elevating buckets on the large wheels into a series of baffle plates mounted at the rear of each wheel frame. These plates place the ballast back into the shoulder. Sweeps mounted at the outside rear of each wheel frame brush ballast from the ends and further smooth the shoulder section.

SKELETONIZING

The Santa Fe skeletonizes track, as needed, using two different methods. Where it is possible to secure fairly high track-occupancy time—as in light-traffic regions or in double-track, traffic-reversal territory—the undertrack plow is normally used. Where traffic is heavy and frequent set-offs must be made for passing trains, the plow is impractical. Under such conditions, the Nordberg Cribex is used to take out the crib ballast.

With either skeletonizing arrangement—plow or Cribex—ballast is invariably deposited in the intertrack space in double-track territory. To remove this ballast and restore the intertrack space to the proper section for best drainage, the road has developed an intertrack ballast conveyor car.

This car consists of a gondola car equipped with a large scoop which folds into the car when it is not in use. In addition, the car is equipped with a power-driven transverse conveyor belt. The scoop digs ballast from approximately one half the width of the intertrack space to a depth slightly below the bottoms of the ties. The ballast flows up the back of the scoop and topples over toward the center of the track and onto the transverse conveyor belt. The conveyor, with the aid of an adjustable baffle, deposits the ballast on the shoulder or down the slope, as desired. The car is pulled by a locomotive at from 1½ to 4 mph and, depending upon conditions, requires from one to four passes to remove the required amount of ballast from the intertrack space.

It's Working on a Crosstie "Dispenser"

The Santa Fe now has on the drawing boards a tie-unloading device which will eliminate the expense—in time and dollars—of unloading new ties from work trains by hand. It will work something like this:

Special tie cars, each carrying 350 ties "racked up" in layers, will be loaded by fork-lift trucks at the treating plant. Atop each car will run a pair of rails on which will operate the unloading machine. In transit, this machine will be carried on a

special flat car. Operated by one man, it will travel the length of the train.

Positioned over one "rack" of ties, the unloading machine, at the direction of the operator, will push the required number of ties sideways out the open side of the car while the train is in motion. Should the operator desire to deposit, say, four ties alongside the track, he'll simply push a button marked "4!" The Santa Fe hopes to have this machine in operation next year.

How It's Unloaded . . .



"CAISSON," with outrigger-mounted threaders, guide rails from train.



NEW RAIL is swung into the track by means of a Speed-Swing loader.



CRIBBING MACHINES remove the high ballast in the cribs between the ties.

ADZING OF TIES is done by a team of three Nordberg adzing machines.





Welded Rail All the Way

Beginning with next year's program, all new rail on the Santa Fe will be welded into continuous lengths before it is laid. This article tells how the decision was reached and how the work is done.

• It was in November 1947 that the Santa Fe laid its first stretch of continuous rail. The installation—five miles long—was made in double-track territory in order that a comparison could be made between it and the adjacent jointed track. Both tracks carried similar amounts of traffic, and other factors which might influence maintenance were likewise nearly equal.

Detailed records were kept of the maintenance required on each track. When the results of the test were tabulated it was found that savings of some \$400 per mile of track per year could be realized with continuous rail. Immediately the road began to schedule the laying of more continuous rail-yearly in ever-increasing amounts. This year some 250 miles of continuous rail were laid-equally 84 per cent of the year's new rail program. Now, with about 400 track miles of continuous rail in service, the final decision has been made: Henceforth, all new rail laid on the Santa Fe will be continuous and, accordingly, next year's entire program calling for approximately 285 track-miles, will be laid with welded 136-lb and 119-lb rail.

The continuous rail being laid on the Santa Fe is welded into 1440-ft lengths—using Linde Air Products Company's oxyacetylene pressure method and the Matisa-Schlatter flash butt-welding process. Gangs, made up of about 95 men each, lay the rail at an average rate of a track-mile per day. Here's how they do it.

From the welding production line the rails are loaded directly onto 32-car trains. Each welding setup uses two of these trains; while one is being loaded the other is being unloaded at the rail-laying site. The 32 flat cars which make up the train are specially equipped with roller-bearing roller assemblies that support 12 rails at a time. Separators prevent lateral movement of the rails while permitting them to move longitudinally. The long rails, drawn onto the cars by a winch, are secured only at the center of the train with clamping plates.

The continuous rails are unloaded two at a time. The crane provides the initial pull to get the rail ends on the ground and each succeeding rail is attached to its predecessor with fish plates. Threaders on each corner of the end car of the train guide the rails

to a second set of threaders which is outrigger-mounted on a freightcar truck-termed a "caisson."

Radio communication is maintained between the locomotive and a train crewman stationed at the rear end of the string of cars and equipped with a portable two-way radio-telephone. This practice speeds up the operation by eliminating time-consuming hand signaling.

With the new rail unloaded near the toe of the ballast section or in the intertrack space the steel gang arrives on the scene.

Their first job is to remove the rail anchors, bond wires, crossing planking and setoffs throughout the rail-renewal territory. The new rail is then set in the center of the track by means of a Burro crane or a Speed-Swing Machine with a threader suspended from the boom. Tie plugs are distributed and the bolts and spikes removed by machine. The joint bars are then knocked off and the old rail and all scrap material is placed to one side of the track.

A cribber is next in line in the "steel gang." This machine removes the high crib ballast after which a team of three adzers prepares the ties for the tie plates. The plates are placed in position after a creosote sprayer coats the plate-bearing areas.

A more recent development is the acquisition of a Fairmont Tie Sprayer which is used in place of the creosote sprayer to apply one of several mastic sealing compounds to the adzed surfaces of the ties. The purpose of these materials is to retard mechanical wear of the ties while at the same time protecting the plate-bearing surfaces from deterioration and decay. A plate liner or pregager lines the plates to approximate gage and the gaging machine which follows sets the plates to accurate gage and drills every fifth tie to receive two Racor anchor studs.

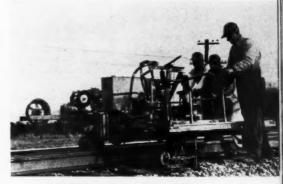
The rail is set onto the plates by a Burro or a Speed-Swing. After spiking, the rail anchors are applied —boxing every other tie. Strings of rail are connected with standard joint bars.

Generally, a rail-laying operation such as this follows on out-of-face raise and tie renewal. After the rail has been laid, a Jackson Track Maintainer moves in and spots up any loose ties, completing the operation.

... and Laid



PRE-GAGER alines the tie plates to approximate gage. This is followed by . . .



. . . A DUN-RITE gaging machine which sets the plates to accurate gage.



INTO POSITION goes the new rail lifted by a Burro crane or Speed-Swing.

RACOR Dual Drivers drive spikes before anchors are applied.



TURES



ELECTRIC TAMPERS are used by section forces in those regions where the Santa Fe has volcanic cinder type ballast

Section Gangs Here to Stay

- What is the Santa Fe's thinking about section gangs?
- To what extent have sections been lengthened?
- What types of work do these gangs do?
- Are they mechanized and to what extent?
- What provision is made for track inspection?
- These and other questions are answered in this interview with the Santa Fe's R. H. Beeder, who is assistant chief engineer system in charge of maintenance.
- "Mr. Beeder, over the past several years some roads have abandoned their section-gang operations in favor of so-called 'district gangs.' Is the Santa Fe considering following this trend?"

"We have been following this trend to the extent which we feel is economical and practical, but all our changes have been limited to carefully selected locations. The section gang is still our basic organization for handling the day-to-day spotting and lining of our tracks to keep them in proper condition.

"Much of our trackage is not adequately served by highways, particularly in the regions of greatest rainfall and under these conditions, the maintenance of long districts by truck-equipped section gangs is impractical. In those selected locations adequately served by roads where the physical condition of the

track structure is excellent and the stability of our roadbed is good, we are continuing to equip our section gangs with trucks.

"We feel that our section gangs, whether they be equipped with motor car or truck, must be supported by highly specialized gangs equipped with the latest modern tools in order to effect maximum economy. One of the specialized types of gangs would be the mechanized tie renewal gang, with at least divisional range, to remove the burden of this chore from the section gangs and secure the benefit of savings accruing through the investment in tie renewal machines designed for that particular purpose and personnel trained for that work."

"How many section gangs do you have on your railroad today?"

"We have a total of 875 sections, most of which are equipped with motor cars.

"The motor car equipped section gangs are usually made up of from 4 to 6 men and cover 15 to 30 miles of main track, depending on density of traffic, speed of trains, climatic conditions and other characteristics. Our truck-equipped section gangs, on the other hand, cover more territory—averaging more than 40 miles of main track—and run 8 or 10 men to the gang. All of our sections have some siding and back track mileage to handle in addition to their main track assignment."

• "Just what are the duties of the section gangs, Mr. Beeder?"

"The major duties of our section gangs are spotting and lining main track. However, they also perform a variety of other jobs—as on most railroads—such as repairing frogs and switches, tightening and changing track bolts, repairing road crossings and set-offs, removing snow and ice during the winter months, repairing fences, inserting crossties in station platforms, road crossings and other locations that are not economical for mechanized tie renewal gang operation, and dozens of smaller chores.

"On our high-speed, heavy-traffic main tracks our section gangs are under the direct supervision of track supervisors, who, in turn, report to the roadmasters. Our track supervisors cover their territory by motor car six days per week. On our less important lines, the track inspection and track patrol work is accomplished by motor track inspectors who report their findings to the section foreman involved. The motor track inspectors also



MOTOR CAR GANGS cover from 15 to 30 miles of main line track and are usually made up of from four to six men.

cover their territory six days per week and each man covers approximately 80 to 100 miles of track, depending upon local conditions."

• "What types of equipment are these gangs supplied with?"

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"Well, aside from the usual complement of hand tools, each gang is equipped with a selected type of power tamper for spotting work. The type of power tampers depends upon the type of ballast and other local conditions. For instance, in slag and crushed rock ballast territory, the section gangs have Ingersoll-Rand 3R-36 air compressors, each equipped with four Ingersoll-Rand MT-4 pneumatic tie tampers. Where we use volcanic cinder ballast, the gangs are equipped with Jackson Electric M-22 portable power plants, each with four Type "LO" vibratory tie tamping units. Incidentally, the truck-equipped section gangs, since they have sufficient manpower and more territory to cover, have two tamping outfits each. We have had a program going for the past six years to provide our gangs with these tamping outfits. This program is now in its final stages.

• "Are these gangs equipped with with any other power tools?"

"Yes. We have Racine power rail saws and Nordberg power rail drills located on strategic line sections and yard sections where they can be made available to our requirements on relatively short notice. We also have power grinders for use in maintaining frogs and switches and for dressing the busi-

ness end of our tamping bars. Fairmont W72 joint bar sprayers are assigned on a division basis and the major portion of our rail joint lubrication work is handled by these machines on a one treatment per year basis. Power wrenches are also assigned out of our centralized work equipment shop for bolt tightening programs and reformed angle bar application programs as required. Each roadmaster has at least one rubber-tired tractor weed mower to handle weed eradication at special locations around road crossings, buildings and station grounds where our regular annual chemical weed killer trains will not reach.'

• "What about housing for your section gangs?"

"Many of our section men have their own homes. But in some localities, particularly in the sparsely populated areas of the Southwest, it is necessary to provide housing for the men and often for their families also. This housing is usually in the form of a small cottage for the foreman and a multiple dwelling for the men. In past years, the housing for the men consisted of a 10 or 12 room concrete structure, but in recent years, we have largely confined our construction of this type of dwelling to insulated prefabricated metal buildings on concrete foundations.

BOLT TIGHTENING, using power wrenches, is another of the many jobs regularly carried out by section forces. Wrenches are assigned out of the central work equipment shop for such bolt tightening programs and reformed angle bar application programs may be required.



TRUCK GANGS cover about 40 miles of track with from eight to 10 men.



SPOTTING takes up more than 50 per cent of the average gang's time.



LINING is the second most important job assigned to the section forces.





EMBANKMENT RESTORATION program is carried out with a variety of equipment. Here a Caterpillar grader shapes a slope.



BULLDOZERS are used extensively all over the system. This International TD18-A is restoring a shoulder.



TOURNAPULL D Roadster is another of the many different machines used in bank restoration and cut-cleaning work.

Machines, Methods, Men and Mud . . .

• Several different methods are used by the Santa Fe to assure good roadbed drainage and to achieve good overall roadway and right-of-way stability. Roadbed grouting has been and still is practiced extensively. Pole driving is employed where it is applicable and bank-restoration and cut-cleaning operations are carried out continuously over the 13,147-mile system. Newer methods of stabilization, too, are finding a place in the overall program-notably the spraying of asphalt and waste oil as described separately in this article.

Grading to Check Erosion

Let's look first at the work being done in the restoration of embankments and the cleaning of cuts. To check the effects of erosion, and to promote better drainage, the Santa Fe began to employ modern earthmoving equipment on a large scale in 1951. The first outfit was assembled on the road's Eastern Lines and consisted of a LeTourneau E-5 Tournapull Roadster, a Caterpillar D4 tractor with a bulldozer blade, a Caterpillar No. 30 scraper and an International TD18A tractor bulldozer. Later a Caterpillar No. 12 motor grader was purchased and added to the initial outfit.

The work schedule of this outfit was programmed on an annual basis. The working force consisted of four machine operators and two local section men, under the supervision of an assistant roadmaster. This original outfit has proved so successful in operation that, at present, three such outfits have been organized to work the entire system. Additional equipment has been added so that today the typical outfit has an equipment complement of two LeTourneau D Tournapull Roadsters, 2 bulldozers-Caterpillar and International equally represented-a Caterpillar No. 12 grader, a %-yd dragline (mostly either Lima or American), and a truck for transporting the men together with necessary supplies, parts and tools. The work force is housed in bunk cars.

Work assignments for these outfits are handled on



CLAMSHELL, built by Koehring, here is depositing material into one of the road's six new Magor air-dump cars.

Objective >>> Roadway Stability

Santa Fe has a veritable arsenal of weapons to combat roadbed instability and poor drainage. Latest addition is a machine that sprays a coating of asphalt or oil on the right-of-way and track section.

a month-to-month basis. The three outfits are assigned to the road's Eastern, Coast and Western lines. During the winter months, the Eastern Lines' outfit is usually transferred to the Gulf Lines.

While these outfits range over the system moving hundreds of thousands of cubic yards of material yearly, other smaller outfits are on the job too, actually handling the majority of the road's cut-cleaning and bank-restoration work. These smaller "gangs" vary considerably in the equipment used—often working only a single bull-dozer and dragline. The number of men and the equipment used depends entirely upon the immediate job.

Nineteen Jordan spreaders are used for shaping, cleaning and restoration work also. These machines are permanently assigned to the road's grand divisions and the scheduling of their operation is under the supervision of the individual grand division general managers. These machines are also used occasionally for snow and dust removal.

Curing Subsurface Ills

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Restoring embankment shoulders and cleaning cuts is only part of the overall problem, however, Subsurface conditions, too, must be kept up to par. To this end, the Santa Fe began a grouting program in 1942 and, typically, really went at it in a big way. At that time, the road's M/W men were dissatisfied with existing grouting equipment, it being considered too slow and too

POLE DRIVING is employed in those areas where grout acceptance is poor. Cost per foot is the same as for grouting.



SPREADER, one of 19 owned by the Santa Fe, is used to shape roadbed section and cut and fill slopes.





GROUTING GANG drives buil points to make holes for the mud points through which grout is pumped into the roadbed.



TRACTOR-COMPRESSOR, a 210-cfm LeRoi, provides air pressure for the grouting gang.

costly. So they developed piston-type grout pumps featuring high capacity and comparatively low maintenance. After the development of the Mud Point for grout injection, Koehring came up with the Railroad Mudjack which met the road's specifications insofar as premixer, valve arrangement and cylinder dimensions were concerned.

During this period of developmental work, the road, through experimentation led by Roadway Engineer J. R. Rushmer, developed its lean grouting mixes of fine sands. Portland cement, fly ash and emulsified asphalt. These mixes, together with the off-track equipment, seem to have provided the solution to a knotty problem. In the early days of grouting, only those formations known as water pockets received attention. Soon, however, as experience was gained, other types of roadbed weakness (slides, split fills, etc.) were attacked. Where previous grout had not been placed deep enough, the lean mixes were injected beneath the original level. Much of the roadbed which has been grouted in this program to date was previously stabilized by tile and pipe drains, rock drains and other methods—all of which had at least partially failed.

The road now has 18 Koehring Railroad Mudjacks

and has grouted a grand total of over 1,100 track miles. "We're not through yet," they say, however, as plans are laid for future operations. Experienced gangs are retained on a year-'round basis. From two to four sets of equipment are assigned to each gang, each set consisting of a Mudjack, a crawler compressor, a water truck, paving breakers, grout points of various lengths, point-pulling devices, hose and small tools.

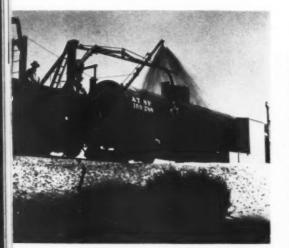
Composition of Grout

The grout mixes most generally used consist of one part Portland cement, one part fly ash, 16 to 32 parts of sand by volume, and a small amount of emulsified asphalt. The sand is normally handled in air-dump cars from company pits and natural gradation is usually about as follows: 100 per cent passes No. 14 mesh; 50 per cent passes No. 65 mesh; and 5 per cent passes No. 200 mesh. Cement and fly ash are supplied in bags by carload lots. The emulsified asphalt comes in 55-gal drums; water is usually trucked from water stations or natural sources.

The same equipment used in roadbed grouting is occasionally used—with richer mixtures—on bridges, tunnels, arches, etc.

Pole Driving Not Obsolete

Grouting, nevertheless, is not a "cure-all." Some locations simply will not accept grout effectively; this has been found to be the case in the gulf coastal plain regions of Texas. Back in the '30's the road started driving shoulder poles in this region as a means for stabilizing embankments, and this practice continues today. Practically all of the Santa Fe's pole-driving work is done on contract by W. H. Nichols & Co., Dallas. In isolated cases some are driven by railroad forces. The poles are all 8 ft in length or longer. They are used green and cost about 7 cents a foot. They are spaced 48 poles per 39-ft rail length. On a per-pole basis the cost is 46 to 62 cents. Cost per track-foot is \$1.00 to \$1.25—the same as for grouting.



ASPHALT and waste oil spray materials are pumped from tank cars, sprayed on right of way.

And Now... "Sprayed on Stability"

Ballast fouling by wind-blown material is a perennial problem on those lines of the Santa Fe that traverse arid or semi-arid regions. Not only does this material get into the ballast but it drifts into the side ditches and blocks drainage.

Currently the attack on this problem has taken the form of experiments with sprayed-on coatings of asphalt and waste oil. The purpose is two-fold: To anchor the loose material on the right-of-way and to provide a "roof" over the track section to prevent sand and dust from getting into the ballast. Another function of the ballast coating is to prevent the percolation of water through the ballast and into the subgrade.

The result is that today there's an asphalt spray car operating on the Santa Fe. Built on a flat car the equipment consists of a large asphalt pump, air compressor, fixed and movable manifolds,

special nozzles and suction hose. It will spray asphalt waste oil at 300 gpm.

Hauled in a work train along with tank cars of spray material, the car is manned by three men. The material is sprayed at comparatively low temperatures—a neat trick. The highly atomized spray (that's the secret!) gets good penetration in reasonably dry materials where a single dosage usually runs to ¼ gal per sq yd. Additional coats can be applied as needed.

"Long-range" features are incorporated too. The car is capable of placing liquid materials at considerable distances from the track and to considerable heights, as on cut slopes in deep cuts. Likewise, it can coat fill slopes down to natural ground. Also, the car can be used to coat bridge ties on open-deck bridges where dryness, sand and dust combine to shorten tie life.



SPRAY TRAIN carries six tank cars of chemical. This equipment, used on main line tracks only, sprays a swath 22 ft wide. Spray formula specifications vary for different types of vegetation.

Wide Range of Climatic Conditions Produces a . . .

... Wicked Weed-Control Problem

Faced with a greater variety of right-of-way plant life than most roads, the Santa Fe has gone in for chemical weed and brush treatment in a big way.

• Running as it does through markedly different climatic regions, the Santa Fe experiences difficulty with many varieties of plant growth. Weed-killing chemicals with the greatest effectiveness on the northern portion of the line may have little or no effect on the plant life native to the southern or southwestern lines.

Early in its history the road began to seek better ways of eliminating or curtailing the growth of undesirable weed and brush conditions—ways which, preferably, would not entail the use of large labor forces and consume excessive time. Under the direction of System Maintenance of Way Chemist C. W. Bothe, such research is continuing today on a system-wide scale with greater intensity than ever.

LPG for Weed Burners

Another development in weed control now being advanced by the Santa Fe is the conversion of some of the older types of weed burners that used oil for fuel to weed burners using liquified petroleum gas. Several pilot models using either propane or butane for weed burning have already been operated successfully with indications of a more efficient job, less overall fuel cost and considerably less expense for equipment maintenance. The first production model of the LPG weed burner will be ready to go to work at the beginning of the growing season next spring.

While chemical methods of weed and brush control are used most widely on the Santa Fe, older methods, such as mowing and burning, also have a place at those locations where they have proven practicable. Mowing, by both on and off-track machines, is regularly used under some conditions. Branch lines, in particular, are often burned and mowed inasmuch as their traffic density often does not warrant the expense of chemical weed elimination methods. Sickle-type mowers are used where ground contour will permit, although rotary and other types of mowers are presently being used in some of the locations where the terrain is rough and the weed growth is abundant. Off-track mowers are found particularly useful for cutting weeds in the vicinity of highway grade crossings to promote visibility.

On several of the branch lines which are located in territories of normal rainfall the use of a good weed spray oil has been found to be more economical and effective than burning. The road's experience has been that a longer control period is attained without the property damage and accompanying ill will which often arise from burning operations. Mr. Bothe points out, however, "it is important to use judgment as to where these oils should be used."

Besides main-line territory, chemical weed control methods are used also on sidings, terminals, yards and important back tracks and branch lines. The chemical solutions used are formulated by various manufacturers

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Extensive research has brought about the development of highly efficient materials and methods—is aimed at even greater efficiency and economy in the future.



SLURRY CAR sprays Borascu slurry around all trestles. Powdered chemical is drawn by suction from trailing boxcar.



ON-TRACK mower of the sickle type. The units shown here are capable of mowing either or both shoulders simultaneously.



OFF-TRACK mowers, such as this one, are assigned to each section and are used wherever the terrain permits.

according to Santa Fe specifications. These specifications, of course, vary with the vegetation to be treated. The first spray formulas used were of the arsenic family; present day solutions are of the chlorate type and include Chipman Chlorax No. 2 and Reade Granicide. Borax MBC #2 is also widely used. Borascu slurry is also applied around pile-trestle bridges.

All spraying of weed-killing and growth-retardation chemicals is done with equipment which has been designed and built by the Santa Fe. The equipment used on main-line tracks sprays a swath 22 ft wide—11 ft from the center of track on either side. Spraying equipment for secondary tracks covers a swath 16 ft wide. Four large chemical spray outfits are in use at present. One of these is a system spray train which has a spray car that is connected to six tank cars containing the spray formula. The train also incorporates a car for applying the Borascu slurry around all trestles.

The system spray train has a full-time job covering the road's extensive main-line tracks; a smaller selfpropelled spray unit applies liquid chemicals to sidings, back tracks, terminal yards and branch lines. Hence, it eliminates the many delays which non-main-line operation of the system train would entail.

Another of the spray units is a machine that operates independently to apply Borascu slurry mixtures on both main-line and important back trackage, implementing the work done by the spray train and the self-propelled spray machine. This car draws the granular bulk Borascu by suction from a trailing boxcar in the work train and mixes it with water from a tank car.

Experiment with Brush Sprayer

The fourth spray outfit is an experimental unit that has been built for use in developing new and improved brush spraying chemicals and gaging their effectiveness. Work with this machine is aimed at eventually setting up a general right-of-way spraying program wherein weeds as well as adjacent brush would be treated simultaneously. When the developmental work has been completed, a brush spray car of adequate capacity and flexibility will be built in accordance with the results of the experimental program. Main objectives of the development work now under way are the elimination of "full-coverage" brush spraying during the growing season, development of dormant brush spraying and a track-spraying method which would be effective during either growing or dormant seasons.

The Santa Fe presently has several hundred experiments under way using the latest in available weed-killing chemicals to determine formulas which will further improve the results now being obtained. The objective of these experiments is to find chemicals and methods which will control weed growth for a full season with a single application. This would be done, preferably, with formulas which have proved effective when applied during either the dormant season or the growing periods. Additionally, the experiments will lead, it is hoped, to improved methods of treatment on the less important branch lines to the end that reasonably good control will be attained for longer periods of time—control which is superior to that obtained with present mowing, burning and oil-spray practices.



THREE 350-ft Warren deck trusses span the main channel of the Colorado river at Topock, Ariz., and carry two main tracks.

Timber trestles are used where multiple short spans are practical

Permanent inspection aids are incorporated in steel structures High-tensile bolts get nod over rivets for field connections

Ballasted decks are favored for all main-line bridges

On the Subject of Bridges . . .



condition. Contributing factors in achieving this long service life are the preservative treatment given the piles and timbers, the practice of preframing them before treatment, the care exercised in applying a coating of preservative to surfaces adzed or cut in the field, and climatic conditions. By these means, plus the inclusion of fireretardant chemicals in the treating solution and the in-service application of fire-protective surface coatings, the road hopes to raise the average service life of its pile trestles to 60 years, thus placing them in the category of permanent structures. Allowing an average life

of only 50 years for the timber trestles and 71 years for the con-

crete, the lower initial cost of the

year mark and are still in good

timber structures produces a lower annual cost, according to Santa Fe estimates.

Prize-Winning Steel Bridges

Steel bridges on the Santa Fe range all the way from single-span I-beam structures to long truss and arch spans. The longest such structure is the Sibley bridge over the Missouri river. Built in 1914, it is 4,084 ft long. Over the main channel there are three through trusses, each 396 ft long. The remainder of the bridge is made up of deck trusses and deck girders. The base of rail on this structure is 101 ft above the bed of the river.

The highest bridge, and the newest large steel structure on the road, is the double-track bridge over

 Not counting culverts, the Santa Fe has 10,627 bridges on its linesalmost all of which have a Cooper's rating of E-65 or higher. This number includes 3,659 steel bridges, 155 reinforced-concrete structures (mostly boxes), 2,646 ballasted-deck pile trestles and 4,167 open-deck pile trestles. The pile trestles alone amount to about 140 miles of track (on a single-track basis), of which about 60 miles have ballasted decks. The open-deck pile trestles are located mostly on branch lines. When such structures now existing on the main lines come up for renewal, they are replaced with the ballasted-deck type.

"Sold" On Treated Trestles

The Santa Fe is thoroughly convinced that, where multiple short spans can be used, the ballast-deck treated timber-pile trestle is the most economical structure. It appears to have sound reasons for feeling this way. A number of its trestles are approaching the 60-

Santa Fe's ballast-deck timber-pile bridge across the Cimarron.



Why Santa Fe Favors High-Tensile Bolts

Several years ago the Sante Fe adopted the practice of using high-tensile bolts in place of rivets in its bridges and other steel structures. They are primarily used in making field connections; rivets still predominate for shop-fabrication work. To date the Sante Fe has used these bolts in I-beam and plate-girder spans, floodlight towers, shop buildings and freighthouses, with good results.

Although high-tensile bolts have a higher first cost than rivets, the road re-

is of the pin-connected Pratt type.

The deck is of the treated-timber

engineers look with favor on the ballast deck for steel bridges. They

explain, for one thing, that ballast

decks enable the track forces to

maintain a better-riding track

across the bridge. They also ob-

serve that such decks are less noisy,

reduce vibration and give less trouble in the event of a derail-

ment. The exposed timber surfaces

of ballast curbs are sheathed with

galvanized metal for fire protec-

Another noteworthy steel struc-

ture is the double-track Topock bridge over the Colorado river,

For several reasons Santa Fe

ballasted type.

tion.

ports economical advantages in their use. The same bolts which are used for fitting up can be used in the finished joint without removal. Two men can tighten a bolted joint as compared with a fourman crew for riveting. Riveting requires more tools and equipment than bolting and often necessitates scaffolding where bolting does not. When a rivet is not tight it must be cut out, whereas a bolt can be loosened and retightened with an impact wrench.

Canyon Diablo, a deep gorge near also in Arizona, which was erected Winslow, Ariz. Erected in 1947, in 1945 to replace a single-track this bridge was built to replace a structure built in 1890. The present viaduct-type structure built in 1900. bridge is 1,507 ft long and consists Top of rail is 225 ft above the botof three 350-ft deck-truss spans tom of the gorge. The main span flanked by a beam span and deckis a 300-ft two-hinged arch which is girder spans. flanked by a 120-ft single decktruss at each end. The truss system

The Santa Fe has sound reasons for feeling proud of the Topock and Canyon Diablo bridges. In 1948, they were both given honorable mention by the American Institute of Steel Construction when it selected the most beautiful bridges in their respective classes for structures built in the period 1942 to 1947.

Aids for Bridge Inspectors

An unusual feature of these structures is that, wherever lacing bars would ordinarily be used on the built-up members, continuous cover plates with perforations were applied instead. The perforations are elliptical in shape and are 12 in by 18 in. in size. It is reasoned that these cover plates not only

present a better appearance but also facilitate inspection and painting of the interior surfaces of the members.

Other inspection aids on these bridges are steel catwalks and railings. On the Topock bridge a longitudinal steel catwalk with hand rails was provided midway between the trusses at a level about 9 ft below the base of rail to permit the inspection of the trusses and the floor system.

Many existing bridges on the Santa Fe are also being equipped with permanent walks and other devices for the use of inspectors and painting and repair gangs. These include movable transverse scaffolds, which are permanently attached to the lower members of truss and through-girder spans and are suspended from trolleys; creosoted planks laid across the lower struts of the crossframes inside of the shorter deck-plate girders; creo-soted-plank walkways supported by brackets welded to both the inside and outside of the longer deckplate-girder spans; galvanized cable hand rails; ladder rungs welded to the end posts of through-truss bridges and to the built-up end pedestals of trusses; U-bar ladder steps leading down the sides of abutments to the bridge seat; and horizontal angles grouted into the sides of piers and abutments.

As a result of these various measures officers of the road report that the quality of bridge inspection and maintenance has improved and the time required to perform the work has been substantially reduced.

Some inspection aids for steel bridges . . .



INSPECTION walkways are constructed on the sides of the longer girders.



MOVABLE inspection scaffold (arrow) is hung from bottom chords of truss.



HOLES (arrows) at top of batter posts provide access to pin joints.

Fighting Fires Before They Start . . .

• Since 1951, the Santa Fe has been conducting an intensive research program aimed at finding ways of reducing fire losses to timber bridge decks and trestles. These tests have even included the building of replicas of end panels of cresoted timber trestles, treating them with various coatings and setting them afire to observe their performance. The effect of weathering also has been a consideration.

The problem was divided into three parts:

 Fireproofing timbers by means of additives applied during the treating procedure.

 Coatings for application to the ties and other timbers on the decks of opendeck bridges.

 Coatings for application to the piles, stringers, bracing and caps of timber trestles.

Extensive tests have shown that triphenyl phosphate and similar chemicals are an effective fireretardant for timber when introduced into the treating solution at the rate of 10 per cent. The cost of this method, when used in the treatment of all members, is about \$16 per lin ft of bridge. In 1957, the road plans to test the additive further by treating a sufficient amount of piling and timbers to construct two 10-panel trestles.

Some experimental coatings already have been in service for a number of years, and the road anticipates at least 12 years of effective service life from them. In applying such coatings the general practice is to coat the top surfaces of the ties with a bituminous material containing asbestos fibers, applied 3/16 in thick. Into this coating clean pea gravel is embedded.

The vertical surfaces of ties where they extend over steel stringers and timber chords, forming lodging places for hot brake-shoe grindings and fusees, are coated with a bituminous mixture containing chlorinated waxes or rubber, or other fire retardants.

Previous tests had revealed to the road that some coatings, when applied to vertical surfaces, although effectively fire-resistant did . . . on Bridge Decks . . .



BITUMINOUS material containing asbestos fibers is applied 3/16 in thick over surfaces of decks. Clean granular pea gravel is embedded into this coating.

. . . And on Piles, Bracing, Caps



GLASS FABRIC strips, 3 in wide, are stapled to the piles, bracing and caps to provide a good bond for . . .

not weather well, while others which did withstand weathering loosened under heat and fell off. As a result of extensive tests the road now favors the use of a synthetic resin for coating piles, caps and bracing. To assure that this material will remain in place when subjected to heat, glass fabric strips, 3 in wide, are stapled to the surfaces before it is applied. This fabric is spirally wound around the



. . . A COAT of Fireplate No. 3 sprayed on surfaces to provide protection. This installation was made in 1956.

piling and applied to the bracing at 12-in intervals.

On trestles that extend 12 ft or less above the ground, the caps and undersides of the deck are protected by the synthetic-resin coating applied over glass fabric stapled to the timber in long straight strips. Where the deck is more than 12 ft above the ground, it cannot be ignited by grass fires and no fire-proofing is necessary.



CORWITH freighthouse in Chicago has all operations under cover and features wide platforms joined by Towveyor system.



- Individuality of design
- Emphasize functional arrangement
- Economy of maintenance and operation
- Comfort of patrons and employees
- Air conditioning where indicated
- Importance of proper illumination
- Plenty of fenestration
- Seek harmony with surroundings



LONG roof trusses were used to place columns off platforms.

Rule for the Architects

• A distinctive feature of Santa Fe buildings is their individuality. At one time the road had standard plans and colors for station buildings, section houses, car and tool houses and similar structures, but these have long since been discarded in the belief that standardization of buildings leads to the perpetuation of inefficient and archaic structures.

Every new building, whether it be a shop building, station, or a freight house, is now designed solely on the basis of requirements at the particular location. The architectural talent to make this possible is maintained in the form of a headquarters staff at the general offices in Chicago and an architect at the headquarters of each of the four grand divisions.

In all of the buildings constructed for and by the Santa Fe, the objective is a simple and well-balanced design. As seen by Santa Fe architects, this implies balance between all the elements which influence the design, i.e., function, economics and geographical location.

Desire for distinctive treatment for stations is reflected by the exteriors .



BUILT with long, low modern lines, this station at Hutchinson, Kan., is of steel and brick construction with liberal use of glass in walls.



SUBURBAN station at White Rock, Tex., shows effective use of brick and plywood for exterior.



DIESEL SHOP at Barstow, Calif., is one of two on the Santa Fe. The other is at Argentine (Kansas City), Kan.

Buildings to Fit the Function

It is their further belief that the design of a building is largely determined by its function, but also should give consideration to such items as actual physical use, ease of maintenance, and the comfort and morale of the occupants. The latter is considered to be of primary importance and involves efficiency of plan, general working conditions and pleasing interior treatments.

They also believe that colors, furniture and materials must be coordinated to produce pleasant and comfortable surroundings. Lighting is given special attention. For offices and shops it is selected to promote high-quality work, efficient production and the health and safety of the employees. Lighting in restaurants is designed with extreme care so as not to offend any of the senses. Air conditioning is installed as a regular practice in most new offices, stations, and restaurants.

The economics of original cost, maintenance costs and operating costs are given thorough consideration in the design of new buildings. The result is that the road is showing a strong penchant for low-maintenance materials such as brick, both inside and out, glazed tile, terrazzo and vinyl-tile floors, porcelain-enamel panels and interior wood paneling. In other words, for the more permanent structures, there is a willingness to pay somewhat higher initial costs to realize the benefits of reduced maintenance. This approach, however, does not preclude the use of buildings with a low original cost. Prefabricated structures, for example, are considered economical for use as yard buildings where fast erection and availability are factors.

Geographical location predetermines a number of items in building design. It is believed, for instance, that local materials usually prove more economical and at the same time reflect the personality of the surroundings. Climatic conditions also are considerations as these affect the orientation of the windows, walls and entrance, as well as the selection of materials for the roofing, insulation, and the side walls.

. . as well as the interiors which feature modern furnishings and materials.



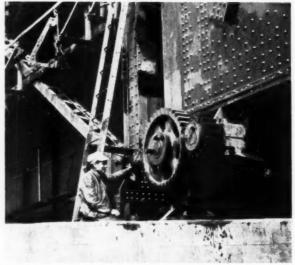
INTERIORS feature low-maintenance materials for waits and floors. Air conditioning is installed in most buildings.



PLANTINGS, furniture, drapes and lighting are coordinated to produce pleasant and comfortable surroundings.



SPOT PAINTING is one of the largest steel-structure maintanance items but it prolongs the time between paintings.



STRUCTURES are thoroughly inspected at least once each year. Catwalk (on girder) is a permanent inspection aid.

How B&B Repairs Are Made

• Bridges are given a general inspection in the fall on the Santa Fe's eastern territories and in the fall and spring on its western and southern districts. Buildings of any consequence are inspected at least once a year. The inspections are made by the local general foreman of bridges and buildings, accompanied by the division engineer and the superintendent.

A careful record is kept of the inspection of each structure. Recommendations regarding necessary repairs are made by the division general B&B foreman. Where major repairs to a steel structure are indicated, the engineers in the road's general offices in Chicago are called upon for assistance and advice in planning the work to be done. The proposed work is approved by the division engineer and the superintendent, and the latter sends it to the regional general manager for final approval. When the work sheets have been approved, the

general foreman usually draws up a program and originates the necessary material requisitions.

Some Inspection Practices

When investigating the soundness of treated timbers, the use of picks and inspection bars of the pointed type is not permitted. The purpose is to avoid piercing the treated portions and exposing the interior to the entry of fungi or water. A sounding bar is the preferred tool for use when testing treated wood members. When dull hollow sounds indicate interior deterioration, a Swedish increment borer is used to determine the extent of the damage. After a core has been removed and examined, the hole is filled with a treated plug.

On many of its steel bridges the road has installed permanent inspection aids to permit ready access to difficult-to-reach places (see page 56). These devices are not only use-

ful to the inspectors but they also serve as scaffolding or staging when painting or repair work is done. The inspection devices are thought to be conducive to more thorough inspection as they give access to the full lengths of deck-girder spans, to the top and bottom chords and lateral members of trusses, and to pedestals and bridge seats.

Housed in Camp Cars

Although a number of roads have adopted the highway trailer for housing their B&B gangs, the Santa Fe prefers to use camp cars. For this purpose it is converting a number of old tourist sleepers to B&B service as bunk, kitchen, dining and commissary cars. Five cars are assigned to an outfit—a foreman's car, cook-and-diner combination, bunk-and-recreation combination, a tool car and a water car.

The cars are wired for electricity and a 5-kw generating plant in the



EYEBAR SHORTENING is done when necessary to make the diagonal members carry their full share of the load.

Thorough inspection and follow-through in doing necessary work keep Santa Fe structures in good condition.

Working force consists of two system steel bridge gangs and a varying number of division gangs, depending on the amount of programmed work.

Crews are well-equipped and comfortably housed in camp cars.

tool car furnishes power when it cannot be obtained from local connections. They are heated by oil-fired circulating heaters controlled by thermostats. Each bunk has shelves for suitcases, extra shoes and other articles. Washing and shower facilities are provided with hot and cold running water. The tool cars are converted from box cars and contain shelves and bins for tools and supplies.

What the Gangs Do

The system steel bridge gangs are engaged primarily in repairing steel structures. Division bridge and building crews are responsible for making routine repairs to buildings and wood and masonry structures. Work on timber trestles consists mostly of renewing caps, miscellaneous single stringers, and some posting of pile bents. Some smaller construction jobs, such as the construction of concrete boxes

and bridge foundations, as well as the erection of small buildings, are carried out by the division crews, but the larger jobs are done under contract.

How They're Equipped

In addition to conventional small tools, the bridge and building gangs are provided with a wide assortment of power equipment ranging all the way from small drills to large cranes. The two system steel bridge gangs are the most fully mechanized because of the heavy character of the work they do. They each have a rotary-type air compressor, a portable generating plant, air and electric-powered tools, both on and off-track welding units, a motor car and push cars, and a 2-ton truck with a power winch. One of these gangs has a 75-ton industrial crane and the other a bridge-erection derrick.

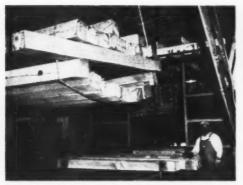
Equipment regularly assigned to



SYSTEM steel bridge gangs have a 2-ton truck with a rear-mounted winch.

the division bridge gangs includes small air compressors and generating plants, air and electric power tools, concrete mixers, cutting torches, chain saws, motor cars and push cars. Some are furnished with a 1½ or 2-ton truck. Pile drivers are available for the use of these gangs. Paint gangs are supplied with air compressors, spraying equipment, and air-powered cleaning tools.

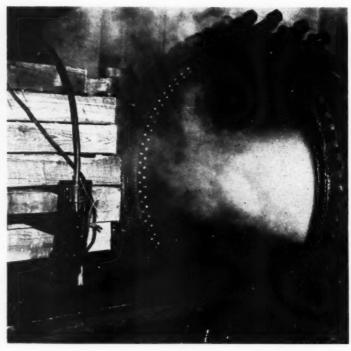
A great deal of spot painting of bridges is done to lengthen the interval between paintings. As a rule the division general foreman of bridges and buildings is allowed to exercise his judgment in determining when a bridge is ready for a complete paint job.



BORING and adzing machine at the Someville plant. A sling of ties is being loaded on the conveyor which will carry them through the machine.







Wood Preservation Pays

Continuous program of research to find ways

to make timber last longer is getting results in

the form of longer life for crossties and trestles.

• What more can we do to make wood last longer? That question is habitually in the minds of those Santa Fe officers who are responsible for the economical use of this vital product. The question of whether they have been justified in putting so much emphasis on this matter would seem to be answered by these two pertinent items of information:

(1) An expected service life of about 60 years for treated timber pile trestles; and

(2) An expected average service life of better than 45 years for crossties.

The Santa Fe was the first railroad in the United States to apply creosote to the railroad tie by the German Rueping process. This happened shortly after the turn of the century. Ever since it has been conducting an extensive program of research and experimentation aimed at finding ways of making preservative treatment more effective. In its broadest sense, timber "treat-ment" on the Santa Fe implies not only the injection of preservatives into the wood but also the use of whatever auxiliary measures, such as preframing and boring and the protection of wood from mechanical wear, may be found effective and economical.

Wood preservative operations on the Santa Fe are carried out in two company-owned and operated plants—one at Somerville, Tex., and the other at Albuquerque, N. M. The Somerville plant is the largest, occupying a 300-acre site just north of the city and employing more than 300 persons.

Adopts Vapor Drying

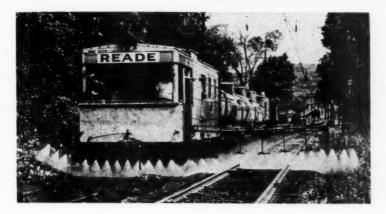
The most important recent development in timber treatment on the Santa Fe has been the adoption of Vapor Drying for seasoning and treating all main-line, hardwood ties. Three Vapor Drying cylinders have been installed at Somerville and two at Albuquerque. In this process, the seasoning procedure and preservative treatment are accomplished in about 24 hr, eliminating the usual air seasoning period of 8 to 15 months. In the Vapor Drying process the charges of ties are

first brought to a high temperature in the presence of about 5000 gal of a drying agent—Xylene derivative. Moisture in the ties mixes with the drying agent in vapor form and is carried out of the cylinder to a condenser. After the ties have been vapor dried they are ready for treatment without removing them from the cylinder.

Santa Fe practice calls for the treatment of all ties with a mixture of 30 per cent creosote and 70 per cent residual oil. The amount of treating solution retained by the wood depends largely on the species of wood being treated. It ranges from 8 to 12 lb per cu ft for oak and 10 to 15 lb per cu ft for gum and pine.

Ties were first treated on the Santa Fe by Vapor Drying at Somerville on June 1, 1954. According to system chief engineer T. A. Blair, "early tests indicated that Vapor Drying reduced splitting to a very low per cent and increased the depth of penetration of preserva-

298 TANK CARS IN USE BY THE READE COMPANY IN THE GROWING SEASON OF 1956



When William James Reade first offered weed killer to railroads some 60 years ago, track labor cost \$.80 per day, on a 12-hour per day, 6-day per week basis.

Small wonder that their interest was confined to making a few tests with perhaps one barrel of chemical.

The enormous growth of our business would make the founder of our company gasp with amazement if he could read this headline.

But this growth is the best proof of the importance of the problem of controlling undesirable vegetation to railroads today.

Many railroads have had wide experience in the use of such chemicals. Opinions vary as to the type of product best suited for individual use, or the best procedure to follow in its distribution and use.

But one thing has come to the surface and is generally agreed upon—"It is not alone the cost per mile, or the amount of worktrain service called for, that counts. Rather it is the over-all benefits—that justify increased expenditures."

There are many things that enter into this subject. We have learned much from practical railroad engineers. And we are quick to go along when suggestions reach us from these men as to improved design of equipment or of improved procedure.

It is a good time to review the subject before plans are made for a chemical program for 1957. We have much new information that deserves consideration not only as related to improved formulations of chemical, but also to the design of equipment that is best suited to individual requirements.

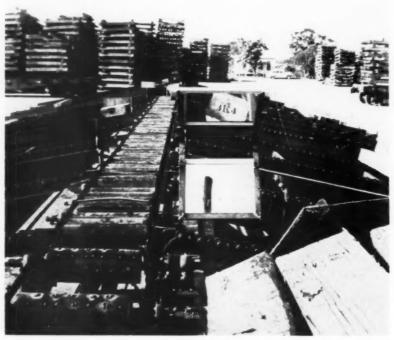
An exchange of information in letter or interview means your time against ours—perhaps time well spent for both of us, whether we do business together or otherwise.



READE MANUFACTURING COMPANY, INC.

JERSEY CITY 2, N.J.

WORKS; JERSEY CITY • CHICAGO • KANSAS CITY • MINNEAPOLIS • BIRMINGHAM • STOCKTON



CENTER CONVEYOR of tie-sorting machine is flanked by a series of roller ramps for ties of different grades. By operation of push buttons at control panel a tie can be discharged from center conveyor onto any roller ramp. Mirrors reveal tie symbols to operator when they are on farther end of tie.

tive and increased retention, overcoming the high percentage of rot." He explains that the three Vapor-Drying cylinders at Somerville and the two at Albuquerque give sufficient capacity to treat all mainline, main-track hardwood ties, "but we will still air season some branchline and all side-track ties."

Hickory Now Acceptable

Experience with Vapor Drying on the Santa Fe has brought about a change in attitude towards the use for crossties of hardwoods, such as hickory, beech and elm. The well-known tendency of hickory to warp and develop bad splits and to decay during the seasoning period, has caused it to be bypassed on the Santa Fe as well as on other roads. The Santa Fe's experience is that these difficulties can practically be eliminated by Vapor Drying. As a result the road now accepts hickory and beech as standard species and is carrying on tests with cedar-elm.

About 90 per cent of ties used on the Santa Fe today are hardwoods. The breakdown goes about like this: 60 per cent oak, 20 per cent gum and 10 per cent beech, hickory, elm and other miscellaneous hardwoods. The remaining 10 per cent consists mostly of western pine, which is the only softwood still being used by the road for crossties.

Incises Air-Seasoned Ties

Before treatment, all Santa Fe ties are adzed for uniform plate bearing and are prebored with as many as 16 holes for spiking depending on the weight of rail under which they are to be used. All ties to be air seasoned are incised before going to the seasoning yard, and those showing a split pattern are doweled after going through the adzing and boring machine. About 45 per cent of the air-dried ties fall in the latter category. In the doweling operation the ties are inserted in a machine which compresses them sufficiently to close the splits and inserts two to four metal dowels at each end.

Preservative treatment is only one of the various measures that have been adopted on the Santa Fe to prolong the life of ties. To find out what had to be done they first had to determine what was causing ties to fail. To this end the road started

the policy in 1950 of using its experienced tie inspectors to supervise main-track tie renewals. Each year since, these inspectors have spent most of their time marking ties for renewal, recording the year inserted, the specie of wood, whether hewn or sawn, kind of treatment, and the primary cause of failure. During the six-year period 1950-1955 the causes of failure were determined for 1,756,174 ties. This number amounted to 43 per cent of the 4,091,509 ties renewed in main track during that period.

These inspections have indicated that getting more life from most species of ties is largely a matter of protecting them from plate cutting, splitting and shatter.

How Ties in Track Are Protected

As a result of the inspection program, the road has adopted as standard for all main-track relays of rail the use of Racor studs as anchor spikes in order to reduce plate-cutting of ties now in track. Additionally, explains Mr. Blair, "we place plastic compounds on the adzed surface of each tie in connection with a rail relay. In regions where plate cutting has been severe on pine or fir ties, we have raised the tie plates enough to pump through vacant spike holes in the plates a plastic compound under the plate. Our tests indicate that this compound is effective for at least five vears.

Crossties on the Santa Fe are now giving an average life better than 30 years. It is expected that the practice of Vapor Drying will increase the life an additional 7 to 12 years. Because of this and other factors, such as the effect of continuous welded rail and the dieselization of motive power, the road is aiming toward an average service life of better than 45 years.

Timber piles and other wood bridge members are treated and handled with the same care that is given crossties. Standard practice is to treat bridge material with a mixture of 50 per cent creosote and 50 per cent residual oil. Timber piles used by the road are largely Douglas fir, and bridge lumber is either Douglas fir or pine. All fir bridge lumber 4 in and over in size is incised before treatment, and all members are preframed and bored before treatment. The only holes not prebored are those required for fastening sway bracing.



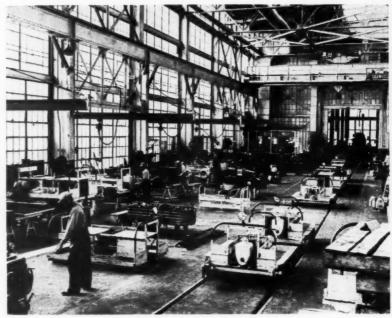


Fact:

Many Machines

Problem:

Keep 'Em Going



MOTOR CAR repair section takes up only a fraction of the space in the two large buildings housing the system work equipment repair shop.

Answer: Centralize the Repairs

Overhauling of all equipment is handled in a system shop at Albuquerque.

Arrangements for repairs, and the assignment of equipment, are speeded by complete records at shop on individual machines, including their location.

• Previous articles in this issue have doubtless given the impression that the Santa Fe maintenance of way and structures forces are highly mechanized. They are! And that is putting it mildly. Including all items, from small hand-held units to the largest cranes, the Santa Fe's M/W department owns and operates a total of more than 10,000 units of mechanized tools and equipment.

Keeping these tools and machines in operating condition at all times is a big job. It's so big, in fact, that the road has created a separate centralized department for handling it. This department is under the supervision of a superintendent of work equipment, system, who reports directly to the chief engineer, system, and the assistant chief engineer, system

Basically, the system superintendent of work equipment is responsible for the repair, maintenance and operation of all types of work equipment and roadway machines operating on the system. All work equipment and mechanized tools needing extensive repairs or overhauling are sent to a centralized work equipment repair shop at Albuquerque, N.M. Generally speaking, those machines that are in operation on a seasonal basis, such as rail-laying equipment, are sent to the shop periodically, that is, during the slack season, for overhauling. Equipment that is in demand more or less the year 'round, such as grading machines, are kept in operation until overhauling or extensive repairs become necessary. Before being sent to the shop all machines are inspected in the field, primarily to determine what repair parts, if any, will be required, thus permitting them to be ordered in advance if they are not already on

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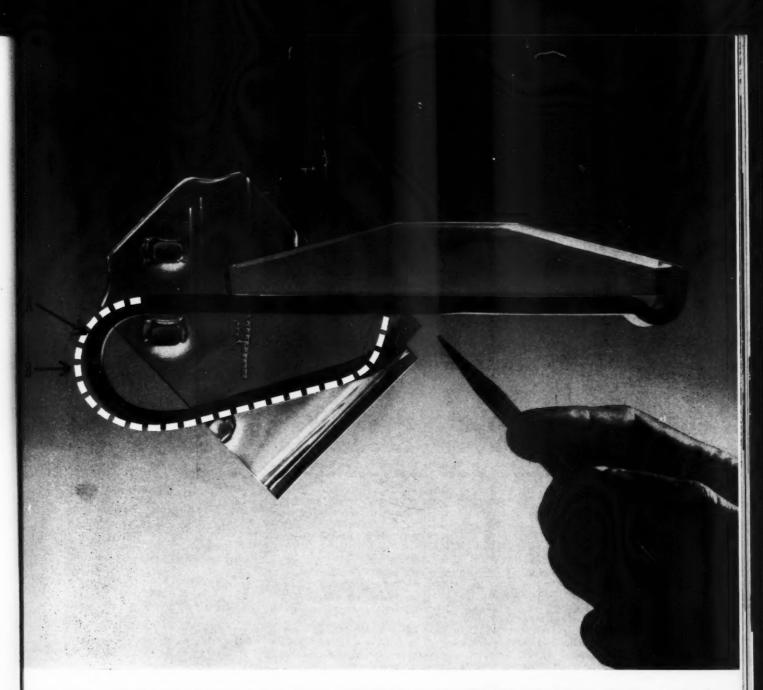
force

To

Field inspections of equipment are carried out by the regional supervisors of work equipment. Minor repairs to equipment are made in the field by the machine operators or traveling motor car maintainers. Both the operators and the maintainers come under the supervisors

Functions of Santa Fe's Centralized Work Equipment Setup

- (1) To furnish work equipment, roadway machines and mechanized tools as required by the maintenance-of-way forces.
 - (2) To rebuild and repair all such equipment as necessary.
- (3) To maintain complete and accurate records on all work equipment and roadway machines owned by the railroad.
- (4) To develop and build experimental and special machines as well as to improve and modify existing equipment as may be found necessary.



NEW BULLDOG CUTS INSTALLATION TIME IN HALF

Broad, Flat Tie-Bearing Surface and 25% Greater Holding Power Features Retained

Now, it takes one or two hammer blows to install a new Bulldog rail anchor...half the previous time and effort.

To accomplish this significant time and cost savings for rail anchor users, True Temper engineers have reshaped Bulldog's anchor spring, as shown.

First, the loop in the spring has been flattened. This raises the point (A) where the hammer strikes the spring and results in a straighter, more direct path between the striking point and the end of the spring which engages the rail flange. Old design (dotted white line) allowed much of the striking force (B) to travel down and around the wider loop.

Next, the new design allows the spring to move within the clamp with less friction, and is angled to "ride" over clamp base (at point indicated by pencil) thus minimizing "pop back" during installation.

With less pounding needed for installation, the new Bulldog will not only last longer but install more accurately.

Why not see for yourself how fast, easily, accurately Bulldog anchors can be installed? Contact your True Temper representative now for a short, convincing demonstration. True Temper Corporation, Railway Appliances Division, 1623 Euclid Avenue, Cleveland 15, Ohio.

Other True Temper Railway Products . . .

BULLDOG Ballast Forks, Weed Cutters, BULLDOG Shovels, BULLDOG Safety Rail Forks, Hammers, Sledges, BULLDOG Scythes.





SEPARATE BAY in the repair shop is set aside for handling off-track equipment. The wide variety of such equipment in use on the Santa Fe is apparent from this view.

of work equipment. In general there is a motor car maintainer on each division, although in some instances a maintainer's territory may overlap on another division if local conditions should make this desirable.

It's a Big Shop

As might be expected from the amount of equipment that has to be maintained, the centralized work equipment repair shop at Albuquerque is an extensive facility. It is housed in two large shop buildings formerly occupied by mechanical department forces, and also occupies several wings attached to one of the buildings.

Facilities for repairing heavy work equipment and heavy roadway machinery are located in a former back shop. Equipment that is rebuilt and repaired in this shop includes such machines as wrecking derricks, locomotive cranes, pile drivers, ballast cleaners, crawler tractors, crawler shovels, and force-feed loaders and track cleaners.

The other building, consisting of a former boiler shop and an adjoining tender shop, is divided into departments or sections, each devoted to a particular type of repair work or operation. There are separate sections, for example, for motor testing, engine rebuilding, general machine shop work, hydraulic repairs, electrical work, repairs to pneumatic tools, sheet metal work, radio repairs, boiler repairs, and for making repairs to light roadway machinery and motor cars. All individual shops are completely equipped with the latest machine tools, testing equipment, and other devices needed for the particular operations.

Shop Office Is Key Factor

Nerve center of the centralized repair shop is the general office section which is occupied by the system superintendent of work equipment and his clerical staff. This staff maintains a complete record of Santa Fe identification numbers assigned to every piece of work equipment and roadway machinery; an accurate running inventory giving the exact location of each machine; a complete data sheet on each machine; and a library of parts books and operating instructions covering all equipment. The records maintained by the office on each piece of equipment reflect, among other things, the various shopping dates for the unit, the work performed and the material used.

When a request for a piece of equipment is received from the field it is channeled through the administrative office. If the unit is not on hand and available at the

shop, an effort is made to secure it from elsewhere on the system. For use in such instances, the office force also maintains an up-to-date record of all equipment in use, with the approximate date of job completions so that machines can be reassigned to satisfy these requests with a minimum amount of transfer time.

Adjacent to the general office is a storehouse section, operated by the stores department, in which is maintained a supply of spare parts. Although requests received from the field for emergency repair parts are handled directly with the stores department, the repair shop office does much to expedite the purchase and delivery of such material. Often, when the repair parts are not readily available to the purchasing and stores departments, the shop is requested to furnish material from its stock.

It Was Not Always Thus

The Santa Fe system work equipment repair shop was not always located at Albuquerque and was not always under the supervision of the engineering department. When the shop was first established, it was located at Topeka, Kan., and was under the jurisdiction of the mechanical department. This was never an entirely satisfactory arrangement to Santa Fe engineering officers. It was their contention that the using department should have jurisdiction over the repair facilities to assure correlation of all functions in the service life of machines with the end result of more complete and economical utilization. The need for bringing equipment repairs under the jurisdiction of the engineering department became greater in proportion to the increase in the amount of equipment owned. Finally, in 1953, jurisdiction over such repairs was transferred to the engineering department, and simul-taneously the central repair shop was moved to Albuquerque.

Here's an idea of the volume of work turned out by the shop. During the period from August 1, 1955, to August 1, 1956, more than 2000 units of equipment, ranging from motor cars to locomotive cranes, were repaired and released by the central shop. And this does not include many hundreds of unclassified items, such as fluid motors and pumps, hydraulic rams, dragline buckets, generators, starters and



RE-BALLASTS BRANCH TRACKS AT 1/3 SAVINGS!



New York Central's Joliette branch line before re-ballasting. Old ballast is heavy and wet.



New York Central plaws-out foul ballast, renews ties, in one fast-moving operation.



After passage of Mannix Plow, roadbed is smooth and level, ready to receive fresh ballast.

The <u>modern</u> way of doing things is the <u>only</u> way for New York Central! That is why the road makes extensive use of MANNIX PLOWS to re-ballast track. The result: faster, better maintenance at one-third savings! Speed <u>your</u> maintenance program, too . . . send for full details of the MANNIX PLOW and Rental Plan today!



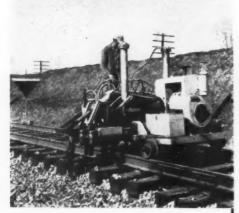
1154 Northwestern Bank Bldg., Minneapolis 2, Minnesota
Phone: FEderal 9-7709

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Track Reconditioned Without Being Raised . . .



TRACK was raised 2 in by Jack-All in advance of the renewals. Ballast Regulator then plowed ballast away from the ends in advance of the cribbing machines.



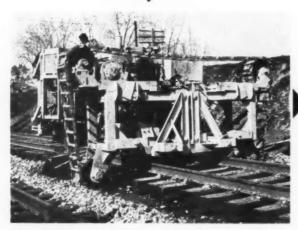
EQUIPMENT was recently demonstrated for doing a complete job of reconditioning track without raising the grade. Demonstration was staged by the Kershaw Manufacturing Company on the Erie near Boone Grove, Ind. It ran for four days, October 25-28, and was viewed by about 150 railroad men. About a mile of track was reconditioned.

in Pictures . . .

News Briefs

To the second se

LEFT—BALLAST was removed from the tie cribs by two Kershaw 2-wheel cribbers. Each cribber has two wheels, one inside and the other outside the rail. Cribbers worked in tandem to catch



UNDERCUTTER and skeletonizer, another Kershaw machine, undercut track to a depth of 4 in below ties. Continuous chain, extending under track, removes ballast and piles it in windrow on shoulder of track.



BALLAST was cleaned by Kershaw ballast cleaner. Regulator then distributed cleaned ballast and Jack-All raised track 2 in for tamping. Track was lined and Regulator and Track Broom finished job.

POSITIONED BASE CURVED BEARING

Rails and rail joints are not finished with the degree of accuracy to templet design as are machined products, consequently, variations within accepted mill tolerances can exist. Such variations will affect the fit of joint bars to the rails. When relatively full or shy joints are applied to rails, a line contact exists at one or more of the fishing surfaces (Fig. 1). Like conditions can exist if there are similar variations in the fishing height of the rail

When the Headfree joint was first introduced, it had a flat bearing surface

Curved Base with Positioned



contacting the rail base (Fig. 3). The radial bearing in the upper web fillet eliminated a line bearing in this area, but the possibility of improper contact on the base still existed and was further aggravated by the development of the larger head-web fillet in the newer rails.

This undesirable condition has been eliminated by the development of the positioned curved base bearing (Fig. 4). This feature is obtained by rolling the bottom contact area of the joint bars slightly convexed, laterally. True, this curvature results in an initial limited bearing, but by careful positioning, the line of contact is placed in the least disadvantageous location, directly under the web of the joint bar. As wear develops, the area of contact increases and because of the curved surface, the heel of the joint bar is raised sufficiently, so that it will not bite into the rail base, impeding inward movement of the joint bars.

The positioned curved base is now in use in all of the Rail Joint Company's standard bars, both Headfree and head contact (Fig. 2), and the proclivity of the latter to cock, is virtually eliminated.

Intensity of Strain is Proportional



Fig. 1—Head Contact—Flat Base



Fig. 2—Head Contact—Curved



Fig. 3—Headfree—Flat Base



Fig. 4—Headfree—Curved Base

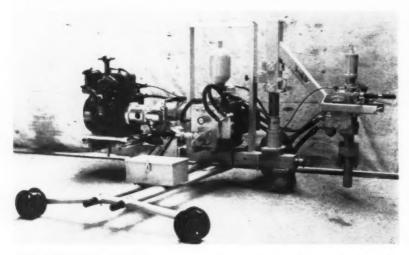
THE RAIL JOINT COMPANY Inc.



PRODUCTS OF MANUFACTURERS...

. . . new, improved equipment, materials, devices

is raised and lowered hydraulically. The assembly pivots laterally on a needle-bearing supported post. The machine, which is self-propelled, weighs 1500 lb and has pneumatic center wheels and self-storing extension lift pipe. Fairmont Railway Motors, Inc., Dept. RTS, Fairmont, Minn.



HYDRAULIC SPIKE DRIVER IS SELF-PROPELLED

KNOWN as the W95 series A, a recently anounced hydraulic spike driver delivers 1000 blows per minute—each with a force of 200 ft-lb. The machine can drive spikes on both sides of one rail without change, and, by reversing the position of the outrigger wheels, it can work the opposite rail. The driving assembly is fitted with an automatic shuttle valve and

IMPROVED TIE-BORING DRILLS

W

A LINE of tie-boring twist drills for use in Dun-Rite gaging machines and with Nordberg and Raco boring machines is now being marketed. Developed with the cooperation of the machine manufacturers, the new line of drills embodies the features of design and manufacturer that have been used in the manufacturer's signal bonding drills. The drills are designed to minimize breakage and grinding and are available in four standard sizes. Howard & Gould Co., Dept. RTS, 105 W. Adams St., Chicago 3.

LIGHTWEIGHT TRACK JACKS

FOUR NEW models have been added to the Simplex line of track jacks which now offers a choice of eleven different models in a range of sizes from 11 to 29 in. in height, with lifts ranging from 5 in. to 194 in. and with weights ranging from 28 to 76 lb. All models are tested and rated at 15 tons capacity.

Some of the design advancements of the new jacks include such features as



We are proud to have contributed to the successful program of the Santa Fe and other railroads.



Fabricators of Structural Steel, Manufacturers of Gray Iron Castings for over 68 years.

HANSELL-ELCOCK CO.

485 West 23rd Place Chicago 16, Illinois

SAVE TRACK SPACE WITH Q AND C CAR STOPS



Q and C Car Stops are economical because they require very little track space and a minimum of labor for application. They wedge firmly to the rails. No drilling is necessary.

One size is suitable for all sections of rail used in yards and side tracks.



Specify them on your requisitions.

THE Q AND C CO.

59 E. Van Buren St. Chicago 5 90 West St.

611 Olive St. St. Louis 1



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You get these benefits when you use STANDARD Rail and Flange Lubricants

STANDARD Rail and Flange Lubricants mean smoother, more economical railroading. Tests prove it.

One test which demonstrated the value of rail and flange lubricants was made on a 45.63 mile stretch of track in a Rocky Mountain state. There were 21.36 miles of curved track on the run. Average curvature was 6.13°. Total included angle was 6,924°. Elevation gain was 3,775 ft. Maximum grade was 2%. The same train of 32 cars and locomotive was used for the test runs which were made before and after the track was lubricated.

With track lubrication, the test disclosed, curve resistance was cut in half. About 96 feet of elevation were gained and an increase of 2.6% in tonnage rating was obtained.

Conclusions reached from this test were that, with track lubrication, substantial improvements in operating efficiency are possible. These can be utilized in three ways:

- I Tonnage hauled can be increased
- 2 Train speed can be increased
- 3 Fuel consumption can be reduced

Still other tests have proved that curve rail and locomotive flange wheel life can be more than doubled through the use of rail and flange lubricants. And in terminal and yard operations in populated areas where quiet operation is important the noise-reducing effect of rail lubrication can mean better public relations.

Get in on these benefits. Get in touch with Standard Oil. Write or call, Railway Sales Department, Standard Oil Company, 910 S. Michigan Avenue, Chicago 80, Illinois.

Quick Facts About

STANDARD RAIL and FLANGE LUBRICANTS

- · Give four to five miles of carry.
- Stay on the track. Won't wash off in wet weather. Won't run off in hot weather or solidify at low temperatures.
- Approved by all equipment manufacturers.

New Products (Cont'd)

parallel non-slip grooves in the lifting toes, thumb guards and trips on both sides, and aluminum alloy housings for greater strength and lighter weight. The jacks provide large forged and machined toes with a lift area of 2½ in. by 3½ in. which, the manufacturer claims, enables them to set more firmly and stand straighter under tie or rail. Three models, the 16A, 217P and 217C, feature the large toe in a height of only 1½ in., thus eliminating the need for driving the jack into position and minimizing the removal of ballast. Two of the 13-in. lifts units, models A17P and 217P, have a stop pin,







but no cap, which reduces overall weight and cost. (Templeton, Kenly & Company, Dept RTS, 2525 Gardner Road, Broadview, Ill.)

THREE of the Simplex track jacks now available from the manufacturer. From left to right they are: The Model A5B—5-in lift; the Model A17P—13-in lift; and the Model 217P—also 13-in lift.

TO THE EDITOR . . .

Readers are urged to avail themselves of the opportunity to express themselves concerning the contents of this magazine.

Says Foremen Have Too Much Responsibility

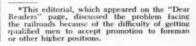
TO THE EDITOR:

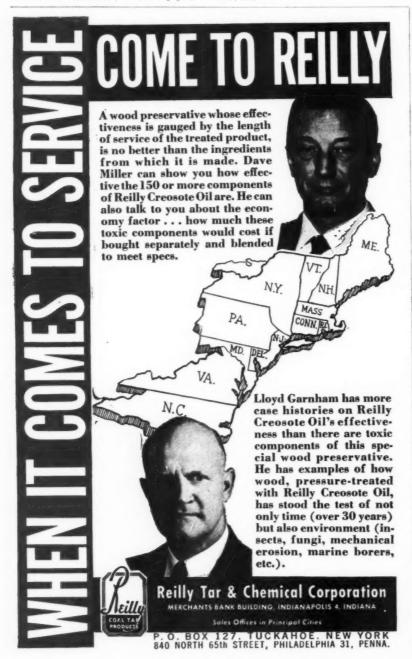
I have been a reader of your valued magazine for many years, and being a track foreman myself, I was particularly interested in your editorial in the August number.*

It strikes me that there are two major reasons why capable men are reluctant to take foreman jobs. One, as you mention, is the lag in the differential between foremens' rates and laborers' rates. According to my experience, thirty years ago a foreman's rate was about 67½ per cent above a laborer's rate. Today it is less than 22 per cent above a laborer's rate. With a little extra overtime a laborer gets as much take-home pay as we do. The extra responsibility is too much for the little extra pay.

This brings me to the other reason why capable men are reluctant to take foreman jobs: It seems that management is continually and persistently dumping more and more responsibility on the foreman with only the slightest raise in rate for the extra duties.

I know of a case recently where a foreman was handed a 200 per cent increase in territory, and more than that in duties, with only about a 7 per cent increase in rate. It all added up to overseeing a territory of 25 miles of main track handling both high-speed passenger and freight traffic; three interlockings totaling about 25 switches, 8 of them remote controlled; about 23 hand-operated main-track switches; three crossings with other railroads; about an acre of passenger station platform to take care of; at least a dozen yard switches with 4 or 5 miles of yard tracks; and at least 10 crossing watchmen to oversee and keep time for-all this, besides making reports and keeping time for the regular track gang. Of course, he also has a





Service More Track, in Less Time, for Less Money with RTW GRINDERS and DRILLS

RTW Grinders and Drills speed up your maintenance work—enable you to keep rails in apple-pie order without crowding your track gangs—and save you money, too. Three popular RTW machines are shown here. All are easy-handling, with quick on/and/off rail action.

MODEL P-44 PORTABLE FLEXIBLE SHAFT GRINDER,

designed to give added savings in labor and costs when laying new track or repairing old.

Grinder's 360° swivel engine mount prevents short bends and kinking of flexible shaft . . . clutch assembly in the engine protects shaft from overload . . . three position wheel clears switches and crossovers easily . . . quickly adaptable for auxiliary equipment: Straight Hand Wheel Piece, Angle Hand Piece for Cup Wheel, Cross Grinder Guides and Track Drill.



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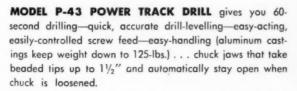
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Grinding wheel spindle and gasoline engine pivot 360°—you work both the rails with only one grinding head. Equipment mounted on transverse carriage which operates on ball bearings running on steel guides.

Pivoted foot clamping device with automatic release holds grinder firmly against rails during slotting.

Hinged and coil-spring-mounted handle for feeding 8" grinding wheel permits easy operation, any depth of cut.

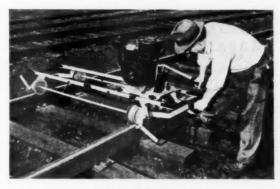


Telescopic extension on rail head bracket for drilling at heel of switch. Levelling device gives perfect alignment for drilling holes through angle bars and bare rails.

Investigate these and other cost-saving RTW track maintenance machines—write for literature.



MODEL P-44



MODEL P-11-S



MODEL P-43

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PAVING BREAKERS

2,400 powerful blows per minute do a better job time busting concrete, cutting asphalt, digging frozen ground or tamping backfill.





SPIKE DRIVERS

For driving cut spikes into treated railroad ties, the SD-55 is equipped with a special nose piece and spike centering tool.

You get more than just a hammer when you buy a SYNTRON Gasoline Hammer... You get a definite assurance of the power, speed and versatility found only in SYNTRON'S performance proven, quality built hammers.

SYNTRON Hammers are best by actual test. One man operation, 100% self-contained—no need for auxiliary equipment—batteries, air compressors, hoses, etc. Reduce job time and cost.

SYNTRON COMPANY
290 Lexington Ave. Homer City, Pa

Letter to Editor (Cont'd)

chauffeur, a machine operator (whom he seldom sees) and an assistant foreman, but it is the foreman who is responsible for everything.

If there is trouble with a switch it is

If there is trouble with a switch it is the foreman's fault; if a defect in track shows up it is the foreman's fault; if a street crossing is not protected it is the foreman's fault; if a man scratches his finger or something worse it is, of course, the foreman's fault, and like as not he is called on the carpet and given a going-over much as if he had committed at least six of the reputed seven deadly sins. The foreman is expected to govern, observe and be responsible for every move of every man every instant, all the time whether he is overseeing one man or a fair-sized gang.

Why would any man in his right mind want, or be willing, to take on such a humanly impossible job?

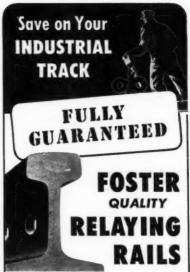
I know of another foreman who has in summer about a man for every 1½ miles of track. In winter this is cut to a man for every 2½ or 3 miles of track, or sometimes it is cut down further so he has had only one man for 10 miles of track, although traffic continues to flow and the foreman continues to be responsible.

Infrequently large mechanized gangs are brought in to do some work on various sections but management gives little heed to what the foreman wants done or where he wants the big gang to work. The impression continues to grow that management prefers a "yes man" rather than a capable foreman who will think for himself.

These are not isolated situations. You can find plenty of them on almost any railroad. Managements seem to have gotten their heads together to see how much and how many responsibilities they can shove off onto the foreman; jobs so detailed, so far-reaching, so wearisome and so worrisome, so varied and at times so complicated that no one man could possibly by any stretch of imagination adequately take care of all of them. Yet some official or some writer will come up and say, "I v onder why no one or so few want to be foremen."

If management would take back some of the responsibilities; if they wouldn't blame the foreman for every little thing that came about; if they would openly work with the foreman instead of seemingly at about every turn trying to make his job as hard and difficult and impossible as they can; if they would help him instead of pushing him and bearing down on him; if they would help train him and his men; and if they would wholeheartedly back him up at all times instead of seemingly frequently trying to jerk the rug out from under him-if these things were done management could make a foreman's job something that good men would want to take and that they would be proud of. That of course includes adequate compensation for the duties involved.

A FOREMAN



Lower installation and maintenance costs—handle more cars better. Foster nationwide warehouses also stock every New Rail Section 12# through 175#, Switch Material and Accessories to meet your specific job requirements.

SEND FOR CATALOGS RT-12



"PROGRESS . . . that Pays its own way"

Yes, quality, service and good allaround business practice do pay their own way as has been the story of the Santa Fe Railroad over the many history-making years. Our congratulations and best wishes for continued success!

We, at Lively, have seen in our own organization this advancement and know first hand that "progress does pay its own woy."



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- Low overall height. BURRO can be loaded and worked on a standard flatcar.



Model 30 BURRO stockpiling rail at welding

Trackwork—a BURRO Crane specialty, is just one of countless jobs these fast, powerful workhorse units are doing on the Santa Fe today. Pound for pound, there's more work-power and versatility built into BURRO Cranes than any other unit. A BURRO takes any job in stride. In the yard, or on the line, it is unequalled for speed and economical performance. That's why the Santa Fe has so many BURROS at work along its entire system.

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New track construction with a Model 30 BURRO is a fast, efficient operation.



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RAILWAY TRACK and STRUCTURES

DECEMBER, 1956

77



THE MONTH'S NEWS...

. . . among railway men-the associations-the suppliers

Changes in Railway Personnel

General

P. G. Shepherd, assistant to the general manager of the Chesapeake & Ohio at Richmond, Va., and an engineer through training and experience, has been promoted to assistant to the regional manager, Central region, with headquarters at Huntington, W. Va.

Engineering

G. B. Stearns, valuation engineer on the Coast lines of the Santa Fe, with headquarters at Los Angeles, Cal., retired recently.

C. F. Muelder, water engineer in the mechanical department laboratory of the Chicago, Burlington & Quincy at Aurora, Ill., has been appointed assistant to the engineer of buildings with headquarters at Chicago. Mr. Muelder has taken over the duties of Walter D. Gibson, water service engineer, whose retirement was announced in the August issue.

Kenneth E. Wyckoff, whose promotion to office engineer on the Great Northern at Seattle, Wash., was recently announced (RT&S, Sept., p. 100), was born August 24, 1914, at Spokane, Wash. Upon graduation from the University of Washington in 1940, he joined the GN's engineering department as a chainman at Spokane.



N E Wyskaff

The following year he was named rodman at Great Falls, Mont., and, in 1942, was named instrumentman at Klamath Falls, Ore. After serving in that capacity at Great Falls and Spokane, he was promoted to division engineer at Spokane on January 1, 1954—the position he held at the time of his recent promotion to office engineer.

Maurice S. Reid, whose promotion to assistant engineer maintenance on the Chicago & North Western was recently announced (RT&S, Sept., p. 102), was born July 22, 1913, at Boone, Iowa. He joined the C&NW in April 1935 and served as tapeman, rodman and instrumentman until March 1938 when he enrolled at Iowa State College. He graduated from Iowa State in June 1940 and rejoined the road as a tapeman at Sioux



Maurice S. Reid

City, Iowa. In September 1940 he moved to Chicago as an engineer accountant and in February 1943 was named instrumentman at that location. From May 1943 until March 1946 he served with the U. S. Army, on the latter date returning to the C&NW as assistant engineer at St. Paul, Minn. In May 1946 he was promoted to roadmaster at Ames, Iowa, and in July 1947 was appointed principal assistant engineer at Chicago. In September 1948 he was promoted to division engineer at St. Paul. He transferred in that capacity to Madison, Wis., in January 1952, and to Chicago in July 1953—the latter position being the one held at the time of his recent promotion.

Samuel R. Hursh, chief engineer of the Pennsylvania, has been appointed assistant vice-president to assist the president in special engineering studies to prepare the railroad "for the types and volume of business that are expected five and ten years hence." Succeeding Mr. Hursh as chief engineer is Chester J. Henry, assistant chief engineer-construction. John F. Piper, superintendent—transportation, Philadelphia Region, succeeds Mr. Henry.

Mr. Hursh was born March 20, 1894, at Mifflinburg, Pa. He entered railroad service on June 24, 1916, as a chainman on the PRR, advancing to rodman the following year. Furloughed for military service from May 5, 1917, until January 10, 1919, he returned to the PRR on the latter date as assistant supervisor on the Maryland division. After serving in that capacity also at Philadelphia, he was transferred successively to the Williamsport division, the Maryland division, the Delaware division, and the Baltimore division. On October 9, 1926, he was promoted to supervisor on the WJ&S and the following year was transferred to the Philadelphia Terminal division. On November 10, 1928, he was promoted to division engineer on the Atlantic division and WJ&S—serving in that capacity also on the Philadelphia Terminal divi-sion and the Pittsburgh Terminal division until October 1, 1934, when he was named superintendent of the Wilkes Barre division. From April 1, 1935, until



Samuel R. Hursh

July 16, 1938, he served as superintendent of the Maryland division and on the latter date was named engineer maintenance of way of the Eastern Pennsylvania division. On October 1, 1940, he was advanced to chief engineer maintenance of way, Eastern Region, and on February 1, 1943, he was promoted to assistant chief engineer of maintenance. Mr. Hursh was named chief engineer—system in January 1954.

Mr. Henry was born in Youngsville, Pa., December 1, 1900. He entered railroad service July 8, 1918, as a trackman on the Pennsylvania at Cincinnati, Ohio. In September 1920 he joined the B&O as a rodman at Flora, Ill., and in the following year he went with the CCC&StL in the same capacity at Springfield, Ohio. He rejoined the PRR June 16, 1923, as an assistant on the engineering corps at Erie, Pa. In 1926 he was



THE B&O CUTS EARTHMOVING COSTS 85% with a D6 and No. 40 Scraper

On its Golden Ring Section between Baltimore and Philadelphia, the B&O is cutting down shoulders to increase open cut. This big job is being done by a CAT* D6 Tractor and No. 40 Scraper, and the big yellow team has slashed the road's earthmoving costs 85%! Here's the proof:

† Cost per yard with D6-Scraper (one man)—42¢ † Cost per yard with previous equipment (6-man crew)—\$2.80

† Includes operation and maintenance expenses – wages, fuel, lubricants, depreciation, etc.

This cost was figured while moving hard-packed dirt and clay near Rosedale, Md. Even in this tough going, the Caterpillar-built unit is making four to five trips an hour over a 300-yard haul with average maximum loads of $4\frac{1}{2}$ cubic yards.

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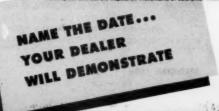
Now the work life and productivity of the faststepping D6 is greater than ever. Today it delivers 75 HP at the drawbar and, because of its sure-footed traction, that's productive power no matter what the footing. And the D6 now has the exclusive Caterpillar oil clutch. Clutch adjustments are rarely needed. Disc replacements are required no more frequently than engine overhauls.

There have been important improvements, too, in Caterpillar Scrapers. Today many models have the new, efficient LOWBOWL design which enables you to load still more material in less time.

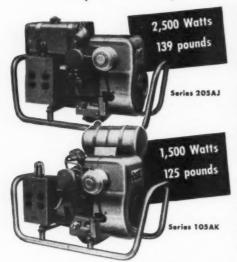
Here is dependable, maneuverable equipment that can be used in practically all of your off-track work. And your Caterpillar Dealer—who specializes in fast, efficient service—will carry your parts inventory. Call him today. He'll demonstrate his cost-smashing equipment on your job...at your convenience.

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These power-packed electric plants give you all the 4-cycle advantages of quick starting, long life and trouble-free operation . . . with an amazing weight saving over usual 4-cycle plants. You can carry them easily to any spot . . . and you can count on them delivering their full rated capacity as long as you need it. Both are single-cylinder, air-cooled . . . completely air-cooled . . . completely equipped and ready to go. Other models to 50,000 watts.

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Railway Personnel (Cont'd)

named assistant supervisor at Long Island City, N. Y., and in 1928 was transferred in that capacity to Wooster, Ohio. In 1929 he was named superviser at Titusville, Pa., and the following year was transferred to Niles, Ohio. After serving as supervisor at Trafford, Pa., and Philadelphia, Mr. Henry, in 1934, was promoted to division engineer at Buffalo, N. Y. In 1937 he was transferred to Pittsburgh, and in 1942 was named superintendent at Toledo, Ohio. From 1943 until 1944 he served as superintendent of freight transportation at Phila-



Chester J. Henry

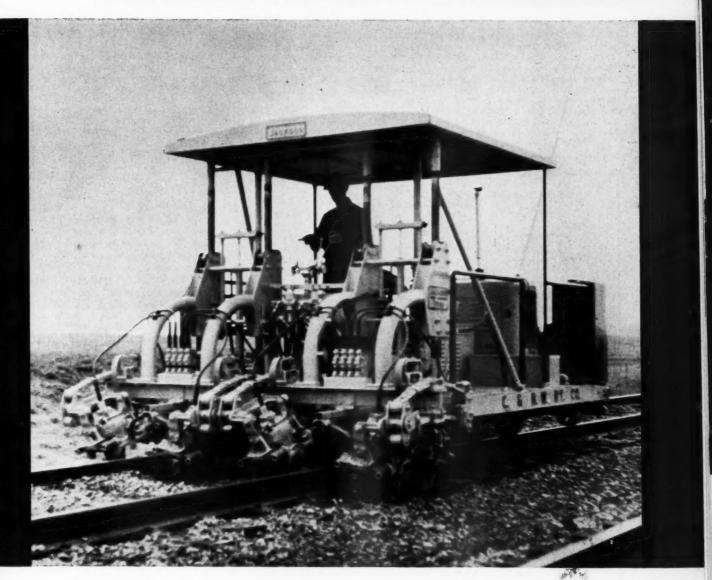
delphia, the latter year assuming the duties of superintendent of the Maryland division at Baltimore. In 1947 he was named assistant chief engineer of the Eastern Region and in 1953 was promoted to chief engineer of that region at Philadelphia. He was named assistant chief engineer-construction in November 1954.

H. F. Longhelt, supervisor of track on the Illinois Division of the Illinois Central with headquarters at Bloomington, Ind., has been promoted to assistant to division engineer of the New Orleans Terminal Division at New Orleans, La. -a newly created position.

R. E. Clancy, roadmaster on the Panhandle & Santa Fe at San Angelo, Tex., has been promoted to division engineer on the Gulf, Colorado & Santa Fe, with headquarters at Temple, Tex. Mr. Clancy succeeds W. S. Autrey, who has been promoted to regional engineer on the Santa Fe at Los Angeles. Mr. Autrey succeeds J. G. Fry, who has been promoted to the newly created position of assistant chief engineer at Los Angeles.

Albert N. Scofield, district engineer on the Pennsylvania at Pittsburgh, Pa., has been appointed superintendent, Truc-Train service at Philadelphia. Mr. Scofield succeeds Howard C. Kohout, who has been named superintendent-transportation of the Pittsburgh region. William G. Dorwart, superintendent-transportation, Pittsburgh region, has been transferred to the Philadelphia region succeeding John F. Piper, whose promoWhen you recommend

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Railway Personnel (Cont'd)

tion to assistant chief engineer-construction is announced elsewhere in these columns.

Theodore H. Kruttschnitt, Jr., senior assistant division engineer on the Coast division of the Southern Pacific at San Francisco, has been promoted to public projects engineer at that location. Mr. Kruttschnitt is succeeded by Hugh G. Bomar, assistant division engineer at Stockton, Calif. John N. Cetinich, assistant division engineer at Portland, Ore., has been promoted to senior assistant

division engineer at Los Angeles, succeeding F. N. Lathrop, who has been promoted to public projects engineer at Los Angeles. Carl A. Inglish, assistant division engineer at Tucson, Ariz., has been promoted to senior assistant division engineer at El Paso, Tex., succeeding C. W. Colins. Rudolph Widmann, engineer maintenance and construction on the Pacific Electric, has been promoted to division engineer at Los Angeles, succeeding L. E. Peterson, who has retired after 43 years of continuous service.

R. A. Swanson, whose promotion to district engineer on the Canadian Paci-

fic at Calgary, Alta., was recently announced (RT&S, Sept., p. 102), was born September 15, 1917, at Ft. William, Ont. He graduated from the University of Saskatchewan and entered the service of the Canadian Pacific on July 2, 1935, in the track department on the Saskatoon division. He served as transitman from 1940 to 1941 when he joined the Royal Canadian Engineers and served as a captain in a Canadian railway operating company. He returned to the CPR in 1946 as a transitman, and in 1947 was promoted to roadmaster at Souris, Man. Later that year he was promoted to divi-

A Question . . .

. . . and an Answer

Looking for the "What's the Answer?" department? It'll be back next month. It was omitted from this issue to allow more space for the special report on the Santa Fe. Questions to be answered in January and February were published in earlier issues. Given below are the questions to be answered in the March issue.

Answers are solicited from readers. They should be addressed to the What's the Answer editor, Railway Track and Structures, 79 W. Monroe St., Chicago 3, and reach him at least six (6) weeks in advance of the publication date (the first of the month) of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you wish discussed.

To Be Answered In the March Issue

- 1. To what extent is it practicable to control the growth of brush and trees on the right of way using off-track spraying equipment? What are the essential requirements for such equipment? Explain.
- When painting steel bridges which have previously been oiled, what methods are most satisfactory for removing all traces of oil before the paint is applied? Explain.
- 3. Is there a need for installing short "cushion" rails on each side of insulated joints in continuous welded rail territory? Why?
- 4. What are the advantages and disadvantages of office partitions less than ceiling height? What types of materials are best suited for such partitions? Explain.
- 5. What size portable pump has the greatest utility in railroad work? What are the more important applications to which such equipment may be put?

TIE PLATE LOCK SPIKES . . . GAGE LOCK SPIKES

Hold Gage—Extend Tie Life
Reduce Maintenance



Gage Lock Spikes in Track

TIE PLATE LOCK SPIKES hold tie plates firmly in place on cross-ties and bridge timbers. They are quickly and easily driven or removed with standard track tools. Driven to refusal, the spread shank is compressed by the walls of the hole. Plates are held against movement under spring pressure. Play between spike and hole is eliminated—gage is held and plate cutting is overcome.

The GAGE LOCK SPIKE is a rail spike, as well as a plate fastening, for use on tangent track and light curves where lateral thrust can be overcome with only two spikes at each plate rather than four cut spikes. It possesses the same features and advantages as the Tie Plate Lock Spike. The Gage spike is offset at the tie plate surface to avoid thrust and wear from the edge of the rail base. The use of Gage spikes saves up to 13,000 spikes per mile and potential damage to the tie from spiking and splitting is drastically reduced.



Tie Plate

Lock Spike

Gage Lock

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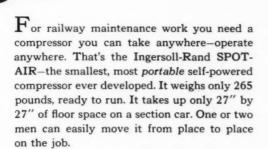
no other gasoline powered compressor like it!



With lifting bar in place, two men can easily carry the SPOT-AIR across tracks or over obstacles. And with the wheelbarrow mounting shown below, one man can move it with ease, keeping up with the progress of the job.



...yet Spot-Air provides ample, low-cost power for FOUR TIE TAMPERS



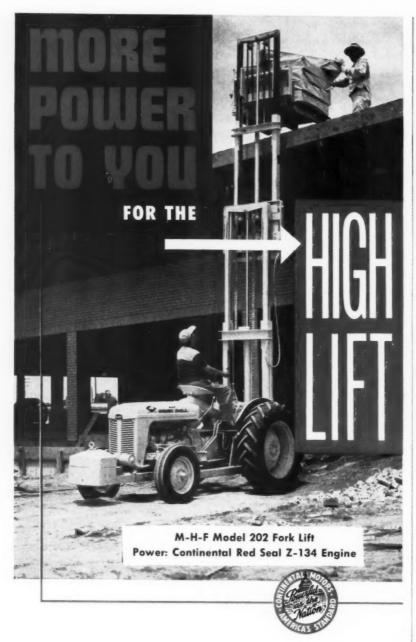
The SPOT-AIR is built to stand up in heavy duty service. Its air-cooled engine operates

under extreme weather conditions with no danger of freezing or overheating. Simplicity of design, with heads, valves, carburetor and magneto all readily accessible, reduces maintenance time to the minimum.

For maintenance of way, bridge construction, grade crossings, signal repairs and a host of other railroad jobs—the SPOT-AIR gives you dependable, low-cost air power, anywhere, any time. For full details, send for a copy of new Bulletin 2264-B.



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Railway Personnel (Cont'd)

sion engineer, in which capacity he served at Regina, Sask., and Vancouver, B. C. In 1954 he was promoted to assistant district engineer on the Alberta district—the position he held at the time of his recent promotion.

Track

C. E. Adams, section foreman on the Illinois Central, has been promoted to supervisor of track on the St. Louis division with headquarters at DuQuoin, Ill., succeeding G. G. Phillips who has been transferred to the Illinois division at Bloomington, Ind. Mr. Phillips succeeds H. F. Longhelt, whose promotion to assistant to division engineer appears elsewhere in this issue.

Association News

American Railway Engineering Association

At a meeting of the Board of Direction held at St. Louis on November 2, the personnel of committees for 1957 and the assignment of subjects were approved. It was announced that 15 sets of the colored slides dealing with engineering and maintenance of way matters were sent to colleges that had requested them. There are 130 slides in each of these sets, and their purpose is to stimulate interest among college students in rail-roading as a career.

Plans have now been largely completed for the 1957 annual meeting to be held at the Hotel Sheraton-Jefferson, St. Louis, March 4-6. Reservation cards for the use of members in obtaining their room requirements will be mailed out to the membership of the association along with the January issue of the AREA News.

Railway Tie Association

At the annual convention of the association, which was held at the Hotel Roanoke, Roanoke, Va., October 25-27 the following new officers were elected: President-Frank W. Campbell, Jr., president, W. B. Crane Company, Chicago; first vice-president-Edward F. Schlafly, secretary—treasurer, Potosi Tie & Timber Co., St. Louis; second vice-president—W. L. Winham, T. J. Moss Tie Company, St. Louis. Members elected to the Executive Committee are: D. B. Frampton, Jr., D. B. Frampton & Co., Columbus, Ohio; M. L. Wilson, Kirby Lumber Corporation, Silsbee, Tex.; Henry Webster, Webster Lumber Company, Minneapolis; R. G. Juengel, Gross & Janes Co., St. Louis; and Douglas Grymes, Jr., Koppers Co., Inc., Pittsburgh, Pa. Roy M. Edmonds was re-

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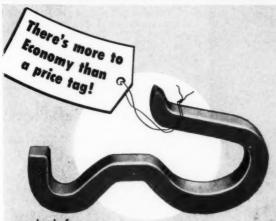
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4 WAY CHEMICAL ACTION of this *proven* deep-penetrating wood preservative combats spike pull, reduces plate cutting, hardens wood, seals out moisture and grit and actually REINFORCES deprevention quality of creosote in ties. Just BRUSH IT ON tie plate areas of new ties, readzed

EASY TO APPLY



surfaces of used ties, and on splits and derailment scars of in-service ties. Then, they'll LAST YEARS LONGER and drastically cut costs. Recommended for M/W Engineers from coast to coast.

RAILROADING'S MOST VERSATILE PRESERVATIVE

Made by the manufacturer of EIGHT of the nation's largest selling wood preserving specialties, Osmoplastic itself has many uses. B & B Engineers use it extensively on splices, heel joints, stringers, in all spike and bolt holes and on piling cut-offs. Signal & Communications Engineers use it for "ground-line" treating of their standing poles.

WRITE FOR FOLDER

Get all the facts, prices, savings and costs from this illustrated folder.



OSMOSE WOOD PRESERVING COMPANY

merica's, Biggest Manufactures of Wood BUFFALO 9 N

980 ELLICOTT STREET

DECEMBER, 1956

Pier structure gets New. Longer Life with THORITE Nonshrink patch, THOROSEAL masonry sealer coat

Structural concrete suffers deterioration from the elements. If these surfaces had been protected from water penetration, freeze and thaw cycle would not have caused these maintenance problems. Workmen are shown cutting out defective areas, patching with THORITE without necessity of forming and then sealing surface with THORO-SEAL.

horite



THORITE 20-minute nonshrink, nonslump patching mortar has received international acceptance by men who know, Architect, Engineer and Contractor. THORITE requires no forming, permitting immediate completion of job.

How to do it " PAGE BROCHURE

STANDARD DRY WALL PRODUCTS, INC.
NEW EAGLE, PENNA. CENTERVILLE, IND.

Thoroseal



elected secretary-treasurer by the executive committee.

Attendance at the convention was 521, including 130 railroad men.

Northwest Maintenance of Way Club

The next meeting of the club will be held on December 27 at the Midway Civic Club, 1931 University Avenue, St. Paul, Minn. The meeting will be adressed by G. Murray Campbell, vicepresident and executive representative of the Baltimore & Ohio at Chicago. Mr. Campbell will speak on relationships, cooperation and understanding between common carrier railroad departments.

Maintenance of Way Club of Chicago

The December meeting of the club will be held on the 17th at the Hamilton Hotel, Chicago. The principal feature of the program will be the showing of a film entitled "We've Been Working on the Railroad," which was produced by the Denver & Rio Grande Western. A brief introductory address will be delivered by John Ayer, Jr., chief engineer of the Rio Grande.

Mississippi Valley Maintenance of Way Club

The club will hold its regular meeting on December 10 at the Coronado Hotel, St. Louis. The principal speaker will be J. W. Barriger, president of the Pittsburgh & Lake Erie, and his subject will be "A Railroad Futurama."

Supply Trade News

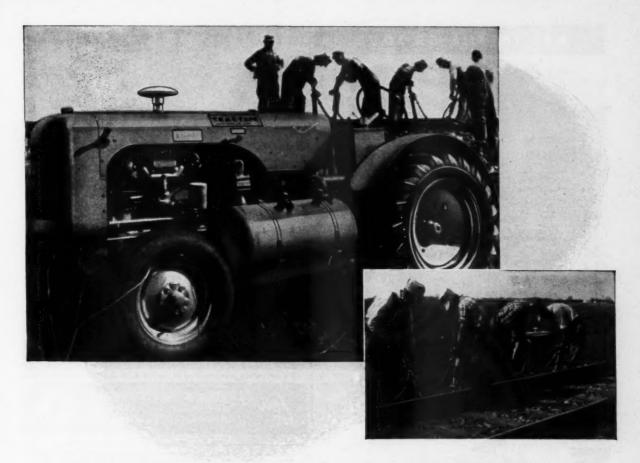
Personal

Angus A. Coughlin, formerly associated with the Connecticut General Life Insurance Company, has joined the sales department staff of the New York office of the L. B. Foster Company.

J. J. Gallagher has been named district sales agent for the Rail Joint Company with headquarters at Denver, Colo. John N. Meade, Denver representative, will retire December 31 after more than 42 years of service with the firm. K. W. Engstrom, district sales agent at San Francisco, has been promoted to district manager at that location.

Arthur C. Frank, sales manager for the Holan Corporation of Georgia, at Griffin, Ga., has been appointed assistant sales manager for the J. H. Holan Corporation with headquarters at Cleveland, Ohio. Robert R. Rector, sales representative for the McCabe-Powers Auto Body

(Continued on page 90)



Get Rid of Slow Orders - in a Hurry

... use the mobility of Le Roi Tractair and the easy holding of Cleveland Tampers, to tamp your bad sections faster

LE Roi's Tractair unit is an off-track compressortractor that has good traction and low center of gravity. It readily crosses or straddles heavyduty rail. It climbs embankments and works on a two-to-one slope with safety. That's why Le Roi Tractair can take air power anywhere, can provide you with a quick, easy way of getting rid of slow orders caused by bad sections of track.

And, since the Tractair unit compressed-air output has been increased from 105 cfm to 125 cfm you can handle four, easy-holding, Cleveland C10T, heavy-blow tie tampers, with air power to spare. The fast, hard-hitting blow, and easy-holding quali-

ties of the Cleveland machine help your section hands do faster, more uniform work.

And Tractair can do many more jobs besides tamping — such as driving spikes, breaking pavement, driving moil points for grouting, powering earth augers, ditching, light grading, weed mowing, stockpiling ballast, cinders, etc., handling off-season work for B&B, Signal, T&T, and Water Service Departments.

Get all the facts on this redesigned Tractair with its increased power. Write our Railroad Sales Department, 327 South LaSalle Street, Chicago 4, Illinois, or to us for our latest bulletin.

T-31



IN THE GROOVE!

















Available with malleable or aluminum alloy housings Most complete line - twelve models

SO O oğ KENLY TEMPLETON,

BROADVIEW, ILLINOIS

RD.

GARDNER

Bolt available with Loktite

Nut No. 2 or std. sq. (shown) and hexagon nuts.

2

- less digging or pounding

toe height

has

x 31/4") lifting toe

(21/2"

capacities from 5 inches to 191/4 guards and trips on both sides

Lifting

2543

WITHOUT COUNTERSINKING 'Wood engineered'' for a smooth level-with-the-surface moisture tight seal without counter-sinking . . . Sealtite fins bear king . . . Sealtite fins bear against wood on a radial plane to prevent turning when nuts are set. Available in Hot-Dip Galvanized finish

FLUSH"

"Itong Life Economy,"
in black for low first
cost. Call, write or
wire for sample prices.

Cross section of head from above, showing bevel and shank.

manufactured in the U.S.A. to A.S.T.M. specifications

BOLT & NUT COMPANY 504 Malcolm Ave. S. E. MINNEAPOLIS 14, MINNESOTA



TRACK **ACCESSORIES**

JOINT BARS ANGLE SPLICE BARS ANGLE BARS for OLD RAILS PLAIN SPLICE BARS TRACK SPIKES

Inquiries solicited.

Manufactured by

TREDEGAR COMPANY

RICHMOND II, VIRGINIA

WORLD'S MOST DEPENDABLE...

Featuring non-slip double grooved

Plan for the future -



Unrelouched photograph of cross section of tie showing underplate and spike-hole area protected for 10 years by Bird Self-Sealing Tie Pad.

SLASH YOUR TIE COSTS WITH BIRD SELF-SEALING TIE PADS

Here is PROOF of the effectiveness and durability of the seal of the Bird Self-Sealing Tie Pad to the tie.

This Bird Self-Sealing Tie Pad was installed on a 1944 cross tie as part of a new rail laying program in 1946. The tie was removed from track in July, 1956 for exhibition purposes.

Note the protection to the underplate and spike hole wood which has been provided over a 10-year period by the Bird Self-Sealing Tie Pad. There is no trace of the well-known effects of moisture or abrasion in either of these vulnerat's underplate areas. Destructive moisture and abrasive materials could not penetrate the seal.

The Bird Self-Sealing Tie Pad is specially designed to provide an effective and durable seal with the tie. The pad also protects this seal and acts as a buffer between the tie plate and the tie to eliminate mechanical wear. That's why you can slash your tie costs at least 50% through the use of Bird Self-Sealing Tie Pads. For further information, write Bird Tie Pads, Dept. HTS-12, East Walpole, Mass.

BIRD SELF-SEALING TIE PADS ARE RECOMMENDED FOR:

Buy the Best...



Buy BIRD

Bridge Decks • Curves • Switch Timbers
Highway Grade Crossings and Other
Paved Areas • Crossing Frogs
Insulated Joints • With Smaller Tie Plates
Pile Cutoffs • Through Station Platforms
Out-of-Face Installations in Rail-Laying
Programs • All other locations where
tie life is short or replacement costs are high.

Supply Trade News (Cont'd)

Company, has joined the J. H. Holan Corporation as sales vice-president. Walter G. Roberson and James Johnson have joined the firm as salesmen.

Ralph G. Greer, manager of the Washington, D. C., office of the International Harvester Company, has been appointed assistant sales manager of the firm's Construction Equipment Division. Mr. Greer succeeds C. E. Jones, who has been named supervisor of national contractors' sales. Mr. Greer has been succeeded in the Washington office by Thomas E. Aughinbaugh, central regional manager, motor truck sales.

Peter J. Wolf, sales manager of the Maintenance Equipment Company, has been appointed vice-president, with head-quarters as before at Chicago. Charles J. Miller has been appointed vice-president of the company with headquarters at New York, where he also holds the position of vice-president of the P & M Co. A photograph and biographical sketch of Mr. Miller were presented in the September issue on the occasion of his appointment to the latter position.

Mr. Wolf was born in Amsterdam, Holland, and came to the United States in 1927. After attending Northwestern University he began his business career with the Western Electric Company, serving in the engineering department. Mr.

Wolf joined the Maintenance Equipment Company in 1940 in general sales work. He was elected secretary-treasurer in 1948 and became sales manager in



Peter J. Wolf

1951. He is a director of the Track Supply Association and of the Maintenance of Way Club of Chicago.

Obituary

Corwill Jackson, president of Jackson Vibrators, Inc., and the Electric Tamper & Equipment Co., died at his home at Ludington, Mich., on September 18, at the age of 75. Early in his business career, Mr. Jackson was a promotional and development engineer for the Gen-



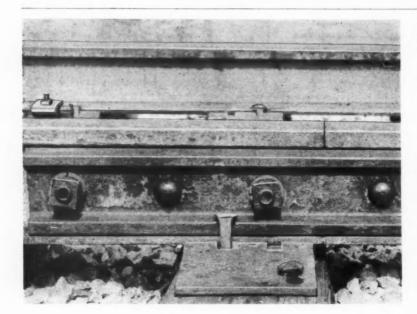
Corwill Jackson

locat

RAII

Texas

eral Electric Company. In October 1916, he entered the service of the Kalamazoo Railway Supply Company on a half-time basis, continuing to devote the remainder of his time to his position with GE. Following World War I he became interested in the problem of tamping track mechanically, and the outcome of this interest was the first electric vibratory hand-held tamper. In 1921 he helped to organize the Electric Tamper & Equipment Co. to manufacture and sell the vibratory tamper. Another of his developments was an on-track tamper of the drophead type but he later sold his interest in this machine. In taking this step he had in mind an on-track tamping machine utilizing the vibratory principle which resulted in the introduction of the Jackson Multiple Tamper in 1947.



Preferred Anchoring for "TIGHT RAIL"

Economical, low in maintenance, "tight rail" has many important advantages including reduced rail-end batter and welding. "Low joints" are minimized.

COMPRESSION Rail Anchors go hand-in-hand with this new construction providing uniform holding throughout the length of the rail.





Here a 22-B dragline excavates a trench for relocation of a railroad near Chamberlain, So. Dak.



This 22-B dragline is cleaning slides and ditches along the owner's railroad near Parshall, Colo.



This pair of 22-B draglines is making line and grade changes along one of the company's lines. This scene is located on THE DENVER and RIO GRANDE WESTERN RAILROAD.



Widening and banking a flood control creek along the Texas-Mexican Railway near Laredo, Texas, is the job assigned to this 22-B dragline.

22-B Draglines . . . Top Choice For Off-Track Maintenance Jobs

Cost-conscious railroad men have found that the exceptionally long range of the 22-B dragline permits it to work at a safe enough distance from the tracks to prevent interference to—or from—rail traffic. They also like the speedy operating cycles that get a lot of material moved in a hurry.

The 22-B is mighty versatile too. It can be changed in the field to crane, clamshell, shovel or dragshovel to handle a limitless variety of railroad maintenance chores.

Crawler mountings with a large bearing area provide the sure-footed stability necessary for operating on uneven, soft, loose or muddy ground. And what a simple matter they make of crossing tracks.

Find out more about how a 22-B can effect great savings in your off-track maintenance costs. The Bucyrus-Erie distributor in your area will be more than happy to furnish you with complete information. Get in touch with him today.



Helps From Manufacturers

The following compilation of literature —including pamphlets and data sheets —is offered free to railroad men by manufacturers to the railroad industry. To receive the desired information, write direct to the manufacturer.

ROCK DRILLS. A three-color bulletin, designated AT111B, has been made available describing the manufacturer's rock drills. The 12-page bulletin uses numerous halftones and line drawings to illustrate the company's line of construction tools—breakers, sinkers, clay spades, tampers, and wagon drills. Individual pages are devoted to tool design and construction, operator handling and care, and maintenance features leading to longer tool life. The lubrication system, drill and blow actions, and valve and piston design receive special attention. The firm's complete line of construction tools is shown on the inside back cover. (Write: Le Roi Division, Westinghouse Air Brake Company, Dept RTS, Milwaukee, Wis.)

MOTOR SCRAPERS. A 16-page, two-color booklet has recently been made

available describing the TS-260 motor scraper. Presented in the booklet is a detailed description of the scraper and its featured components. Operating features of the TS-216 are described and illustrated with photographs and one page is devoted to presenting complete specifications of the scraper. (Write: Allis-Chalmers Mfg. Co. Dept RTS, Box 512, Milwaukee, Wis.)

STEEL PRODUCTS. There has recently been made available a fully illustrated and indexed 70-page catalog describing the manufacturer's steel products. The product listing is divided into broad classifications which include semi-finished and hot-rolled steel, heavy and special steel items, rails and accessories, wire and wire products, overhead conveying equipment, industrial screens and wire fabrics, springs and formed wires, etc. Also included in the bulletin is a directory of the manufacturer's plant and sales offices throughout the country. (Write: Colorado Fuel and Iron Corporation, Dept RTS, 575 Madison Avenue. New York, N. Y.)

EARTH MOVING EQUIPMENT. A 16-page, two-color booklet has recently been made available describing the products and services available from the manufacturer. The booklet is profusely illustrated with action photographs and contains specifications. (Write: Allis-Chalmers Mfg. Co., Dept RTS, Box 512, Milwaukee 1, Wis.)

POLE-TYPE CONSTRUCTION. A 12-page booklet entitled: "Low-Cost Pole Buildings for Industry," has recently been made available, illustrating the many uses being made of pole buildings. the manufacturer points out that many industrial and business firms are beginning to view pole-type construction as a means of obtaining needed space at a minimum expenditure. (Write: Dow Chemical Company, Dept. PEN8—RTS, Midland, Mich.)

CRAWLER TRACTORS. "The D9 in Action," an 8-page, two-color booklet, has recently been published describing the D9 tractor employed on a full range of jobs under varied working conditions. Illustrations are accompanied by text material quoting the recommendations of users. Information on specific jobs where the tractor has been used and accepted are included. (Write: Caterpillar Tractor Company, Dept. RTS, Peoria, Ill.)

CRAWLER CRANES. A new four-page, illustrated bulletin, describing the crawler-mounted model C-35 "Bantam" has recently been made available. The bulletin, No. C-101, contains detailed information containing the latest specifications, features, capacities and application data for the manufacturer's crawlermounted 3/8-cu yd, 5-ton crane-excavator model. Complete machine specifications are listed, and operating ranges and capacity ratings are shown in conjunction with large, easy-to-read charts covering the crane, shovel and backhoe attachments. (Write: Schield Bantam Company, Dept. RTS, Waverly, Iowa.)

The experience and results of 20 years,

14 million poles

stabilizing 2,000 miles of roadbed

We take this opportunity to express to the Santa Fe our appreciation for the privilege which has been ours over the past 20 years of supplying a portion of their maintenance of way needs, by the pole method of roadbed stabilization.

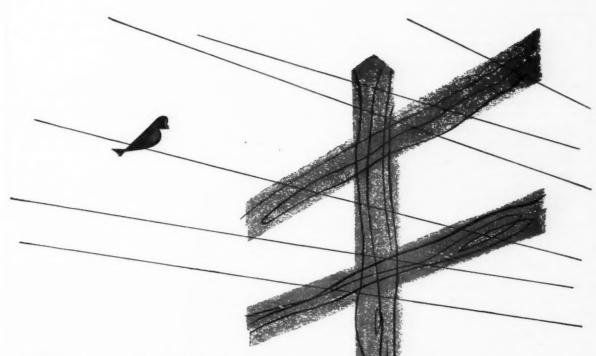
For over 20 years the Santa Fe and other major railroads have used the services of W. H. Nichols & Company, Inc. in meeting their requirements for roadbed stabilization. During this time we have successfully stabilized over 2,000 miles of mainline roadbed at locations throughout a wide range of United States territory. In this effort we have installed approximately 14,000,000 stabilization poles. The economies and improved track conditions which our customers have enjoyed as a result of this work make a story of especial interest if you are faced with maintenance problems developing from unstable roadbed.

W. H. NICHOLS & COMPANY, INC.

GENERAL CONTRACTORS
3015 GRAND AVENUE
DALLAS, TEXAS



W. H. Nichols & Company, Inc. offers you the highly specialized experience of over 20 years in correcting a wide range of roadbed stability problems. Besides this service experience we can provide what is probably your most economical means of correcting your roadbed stabilization difficulties.



Things to think about

when investing in treated wood products

Q. How much longer than untreated woods, do treated woods last?

A. Properly treated woods, such as woods treated by the American Creosoting Company, last four, five, even ten times as long as untreated woods. Under many conditions, wood treated by Amcreco may be considered essentially permanent.

Q. Are all modern-day wood preservatives about equal in value?

A. No, you can't assume that they are because none of the newly introduced preservatives have as yet been tried by the test of time. Creosote, on the other hand, which has been the number one wood preservative for over fifty years, is still number one in customer preference because of its established service record.

Q. Are all treatment companies about the same — one's as capable as another?

A. No, all treatment companies are not about the same. Some, such as the American Creosoting Company, which has been in the business for over fifty years, have more experience than others. Some, such as the American Creosoting Company, have had an opportunity to build up a treatment and service organization that is second to none.

The next time you are in need of wood products, specify treated wood products... poles, cross arms, conduit and other construction woods that have been pressure treated in creosote by the American Creosoting Company.

We would appreciate the opportunity to quote on your needs.

AMERICAN CREOSOTING CORPORATION

Colonial Crossoting Company Federal Crossoting Company Indiana Crossoting Company



Gulf States Creasating Company Georgia Creasating Company Kettle River Company

GENERAL OFFICES: LOUISVILLE 2, KENTUCKY

AMCRECO
LOWRY PROCESS
CREOSOTED WOOD
Since 1904

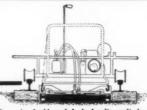
NO MORE TRENCHING!
NO MORE JACKING UP TRACK!

This WOOLERY

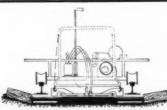
TIE-REMOVING TEAM

NOW ELIMINATES SLOW,

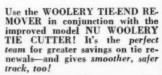
After the tie has been cut on both sides by the WOOLERY Tie Cutter, the operator of the Tie-end Remover—(who follows closely behind so that operators can assist each other in removing machines from track)—lifts the center section out with tie tongs.



A double-ended hydraulic cylinder is then lowered into the tie bed. A simple turn of the valve moves these two pistons outward, pushing the tie-ends completely clear of the rail—whether



working with single or doubte shoulder tie plates! The crib is now open and only the necessary amount of ballast is removed to admit the new tic.



For highest efficiency two Tie Cutters should be used ahead of one Tie End Remover.

The trend toward heavier rail and double shoulder tie plates has made removing tie-ends increasingly difficult. With the WOOL-ERY Tie-end Remover, this task can now be done in less than a minute by one man with no more effort than that required to turn a value!

WOOLERY

MACHINE COMPANY

2919 Como Ave. S. E., Minneapolis 14

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THE NO. 12 BUILDS ROADBED... THEN MAINTAINS IT



THE CAT* No. 12 is an off-track workhorse. Here George Bennett Construction Co., Kansas City, is using one to complete a three-mile reconstruction job for the Missouri Pacific. And when trains operate on this new roadbed, a No. 12 will be helping to maintain it.

The No. 12 is grading the line revision job near Martin City, Mo. One fill is 30 feet high, 110 feet wide at the base and 70 feet at the top.

Here the No. 12 is proving that it is as dependable as it is versatile. Explains Jim Supica, field superintendent for Bennett: "Down time isn't any problem. It stays right in there working when some of the others would fall out."

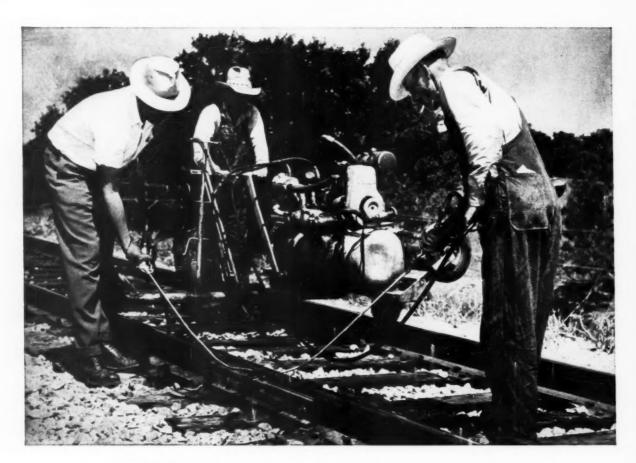
The big yellow machine gives you this same dependability whether it is shaping embankment, eliminating irregular fills, controlling weeds and brush, policing the yard, taking up track, pulling ties or, in the winter, clearing snow. And the No. 12 now packs *more power*. It gives you 115 HP and has faster reverse speed. In addition, its exclusive Caterpillar oil clutch provides more economy and efficiency than ever. Maintenance is greatly reduced and no external lubrication is required. And now tubeless tires are furnished on the No. 12 at no extra cost. They eliminate the down time and expense caused by tube and flap trouble.

Now's the time to call your Caterpillar Dealer—to see for yourself the greater productivity, lower cost and longer work life of the No. 12. He will demonstrate any of his three models of motor graders on *your* job.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR* *Caterpillar and Cet are Registured Trademarks of Caterpillar Tractor Co.

99% OF ALL CAT MOTOR
GRADERS EVER BUILT
ARE STILL ON THE JOB



This is how Santa Fe lubricates rail joints

No taking down joints, no interference with traffic. The Santa Fe simply sprays *Texaco* 941 *Rail Joint Lubricant* behind and above the joint bar (see picture). The resulting benefits are many.

Texaco 941 Rail Joint Lubricant penetrates quickly onto the fishing surfaces and around the bolts—has outstanding ability to prevent rusting, frozen joints, kinks and pull-intwos. It gives long lasting protection because it is not affected by moisture or temperature changes.

Join the Santa Fe and other leading railroads who for years have used this simple, speedy and economical method of rail joint protection. A Texaco Representative will gladly give you full information.

Just call the nearest Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Or write:

The Texas Company, Railway Sales Division, 135 East 42nd Street, New York 17, N.Y.



